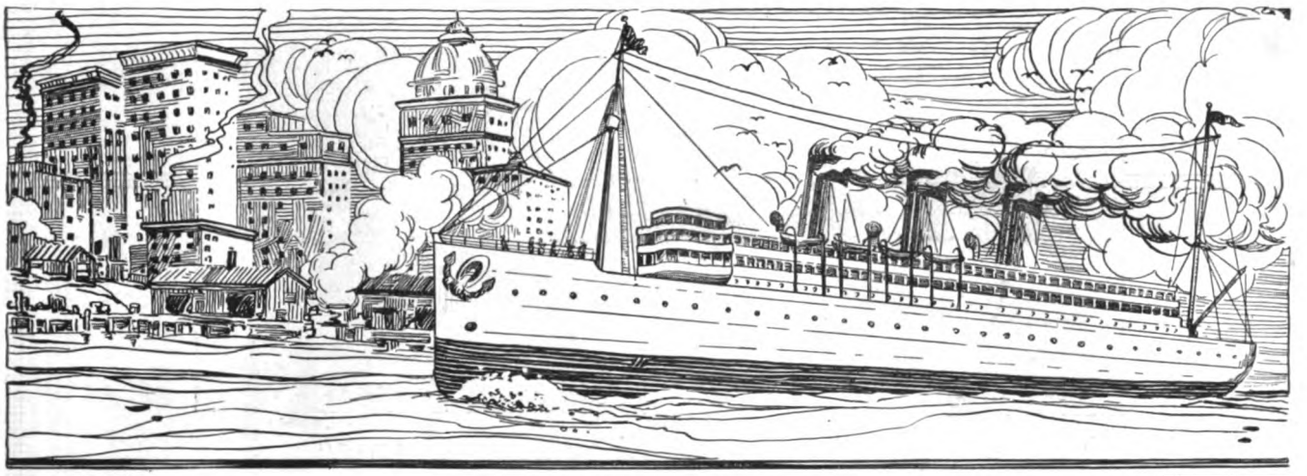

CLEVELAND—NEW YORK, JUNE, 1916

THE MARINE REVIEW

A Monthly Publication Devoted to Ship Building, Marine Engineering and the Business of Transportation by Water.

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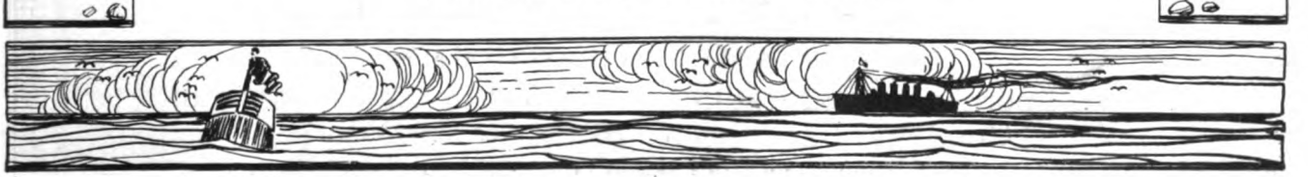

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THE MARINE REVIEW

VOL. 46 CLEVELAND JUNE, 1916 NEW YORK No. 6

A Fresh Point of View is Needed

We Are Confronted by a Unique Problem in the Re-establishment of the American Merchant Marine Demanding American Methods for Its Solution

AMERICAN ship yards are assured of capacity operations for two years or more. But what of the long look ahead? What permanent results may be expected to flow from existing prosperity? Must we look forward to a relapse into the deplorable conditions existing before the outbreak of hostilities in Europe, or can we hope to build an enduring, serviceable structure on the foundation now being laid? These are questions that are occupying the attention of men interested in the permanent welfare of the American merchant marine.

The Flag Will Not Come Down

It is now generally conceded that the recrudescence of American shipping is no temporary affair —permanent, substantial results are assured. We are on the right course. This, however, does not mean that no breakers lie ahead. The work of re-establishing the American flag on the high seas has only just begun. Many problems remain to be solved, but the flag will not come down.

But before any great results can be achieved, the attitude of the government must undergo a radical change. Antagonism must give way to co-operation. Hide-bound servility to certain class interests must be replaced by a broad appreciation of the welfare of all concerned, owner, manager, licensed officer and seaman. It would also seem desirable to undertake a somewhat radical reorganization of the time-honored methods of ship construction and operation, so as to counterbalance the inherent disadvantages in initial cost and operating expenses resulting from the higher standards of living and wages existing in the United States. This should be done for the self-preservation of the American merchant marine, regardless of any action taken by the government.

The whole ship owning, ship operating and ship building system is honeycombed with old-world conservatism and what is needed in America is a fresh point of view. We should tackle our shipping problem in a characteristically American manner. We are confronted by a unique problem. It demands a unique method of solution.

First of all, let us build ships wholesale, to standard specifications, and let us be whole-hearted about it. By this we mean the ships should be actually, not theoretically, standard. Vessels of the same class should be alike not only in form, dimensions and power, but in details like box cars or locomotives. They should be built in lots, not of a dozen but of fifty or a hundred. Only in this manner can production costs and operating expenses be reduced to a minimum. Such vessels could be fabricated like standard bridge spans. In working out the details a leaf could profitably be taken from the experience of the Master Car Builders' Association. Before the standardization committees of this organization got together there was as much chaos in the railway construction field as now exists in ship building circles. The work of the Master Car Builders' Association was not done in a day. It is the result of years of painstaking co-operative effort. But it has accomplished wonders, and it is doubtful if the difficulties that have been overcome were any less numerous than now confront the ship builders.

A New Point of View

Operating methods also should come in for an overhauling, and in this connection the point of view of the steel manufacturer, who is willing to scrap machinery worth thousands of dollars for the purpose of installing new equipment that will require one or two less men, is worthy of consideration. For instance, why aren't automatic stokers employed more extensively on shipboard? You say it can't be done. But it is done in power plants ashore and on locomotives. Some day it will be done on the sea, and the man who does it, and introduces other similarly radical innovations, will give our merchant marine the final punch it now needs to put it in a class with other permanently profitable American business enterprises.

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New Barge Handles 2,800-Ton Cargo

Novel Mississippi River Craft Driven by Internal Combustion Engines Makes First Trip—Official Welcome at New Orleans

By H. H. Dunn

THE Inland Navigation Co.'s new self-propelled barge, INCO THE FIRST, planned by her owners and shipping men of the Mississippi valley to restore navigation on the great inland waterway and its tributaries, handled the unexpectedly large total of 2,800 tons of freight on its first trip from St. Louis to New Orleans and return. Mention of this event was made in the May issue of the *Marine Review.*

INCO, which is the first of a fleet expected to grow to 35 barges, ranging from 1,600 tons up to 3,000 in capacity, her big cargo box filled with freight, arrived in New Orleans April 24, and left April 27, with 1,200 tons of northward-bound freight to be distributed between the Crescent City and St. Louis. More than 800 New Orleans shipping men turned out to welcome the motor barge. The board of port commissioners on the tug SAMSON; the Association of Commerce with many guests on the steamer SIDNEY; scores of townspeople on the excursion boat MAJESTIC, and the motor boat DESTREHAN, with another party, journeyed 10 miles up the Mississippi river, and, amid the blowing of whistles by more than a hundred craft along the 25 miles of harbor front, gave greeting to the barge.

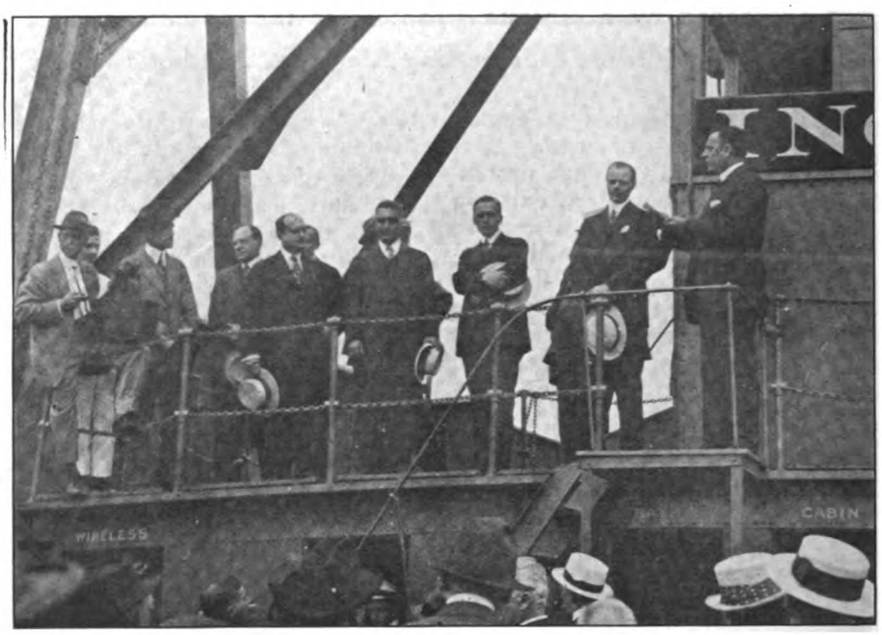
Then, headed by SAMSON, the procession moved down the water front to a point opposite the Algiers drydocks, where INCO THE FIRST, turning with the ease of a destroyer against the current of the Mississippi, swept back up to the Robin street wharf, followed by the flotilla which had met it further up the river. The barge tied up, and Ernest Lee Jahncke, president of the Association of Commerce, and commodore of the Southern Yacht Club, presented the greetings of the city of New Orleans and the congratulations of the shipping interests of the south to John H. Bernhard, inventor of the barge and promoter of the Inland Navigation Co.

Wants River Transportation

"We want the rivers used again," said Mr. Jahncke, "not to fight the railroads, but to supplement them and thereby give to our commerce a balanced and co-ordinated transportation system, elastic enough in its capacity to meet all our needs."

Mayor Martin Behrman, of New Orleans, formally welcomed the new venture in the name of the city and of the state of Louisiana. He was followed by Jefferson D. Hardin, of the Board of Commissioners of the Port of New Orleans, who was loudly cheered by the more than 2,000 spectators when he said: "I believe this step by the Inland Navigation company will revive river trade along the Mississippi, especially between St. Louis and New Orleans." He promised the hearty support of the board of port commissioners to the new barge line.

Mayor Wood, of Joliet, represented the state of Illinois at the New Orleans celebration. He spoke on the importance of the barge line, and told of the $20,000,000 project for a navigable connection with Lake Michigan, to bring the great lakes in direct connection with the Mississippi river. Mr. Wood was followed by Mr. Bernhard, president of the Inland Navigation Co., who told of his struggles on a capital of fifty cents and a sheaf of blue prints to secure capital for the barge he had invented. Then he found D. A. Thomas, the Welsh coal operator, who agreed to finance the $9,000,000 corporation which is putting the barge at work. A. Rust-Oppenheim, of New York, representative of Mr. Thomas, and vice president of the Inland Navigation Co., made the announcement that the company expects weekly barge line service between New Orleans and St. Louis would be inaugurated May 13, and that as soon as enough of the remaining 34 barges of the fleet were completed to insure proper maintenance of schedules, daily departures from each of the terminal ports would be attempted.



THE OFFICIAL RECEPTION AT NEW ORLEANS
Ernest Lee Jahncke, president of the Association of Commerce at New Orleans at the right delivering address of welcome to John H. Bernhard, inventor of the barge, next to Mr. Jahncke on the bridge of the new craft on her arrival in New Orleans, April 24

Besides Mr. Oppenheim, with Mr. Bernhard on the barge on its arrival were Harold Imbrie of William Morris Imbrie & Co., of New York, and Harry R. Warfield, of Baltimore, vice president of the Baltimore Trust Co. All expressed themselves as confident of the permanent success of the undertaking, while Mr. Oppenheim took occasion to remark that his principal, Mr. Thomas, was determined to stand behind the new corporation until it was established and in a paying position.

After the speechmaking, the barge was thrown open to the public for inspection. The crew consisted of Henry

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Lindenburn, Cincinnati, captain; Charles O'Neil, St. Louis, first mate; George Heckman, St. Louis, chief engineer; T. M. Ellis, New Orleans, second engineer; Anthony Cruttendon, wireless operator, and Emmet Danes, oiler. C. E. Farrell, of New Orleans, made the trip down the river as freight agent.

INCO THE FIRST is an all-steel barge 240 feet long, 43 feet beam and drawing, loaded to capacity, 7½ feet of water. Her speed is 14 miles with the current and better than 9 miles an hour against it. She is practically unsinkable, having four bulkheads, all water-tight, over which is superimposed a cargo box, also steel, with removable sides and top hatches, 240 x 40 feet. Her capacity is 1,600 tons.

The barge is driven by four 80-horsepower internal-combustion engines, made by Fairbanks Morse & Co., Chicago. The engines operate four independent propellers, and also drive a dynamo for the production of electricity by which the barge is lighted, steered, and with which the crane which travels over the cargo box is operated. Complete wireless equipment is carried. The boat is entirely electrically controled and operated from a switchboard on the bridge.

On the journey down the river from St. Louis to New Orleans, the boat used 3,000 gallons of oil, about 30 gallons per hour of actual running time. Her fuel tanks hold 12,000 gallons, giving her about 400 hours of running time without refilling.

She is provided with a gantry crane, which, moving the entire length of the cargo box, can deposit freight 68 feet from the side of the barge, a sufficient distance to reach riverside platforms even at the smaller ports where there are no wharves, or to transfer cargo from the barge to sea-going ships while lying in midstream. This pioneer barge in the new river service cost $94,500.

Ships Are Sold at Auction

CONTRACTS for two ships now under construction were sold at an auction held recently at the Maritime Exchange, New York, under the direction of the ship brokerage firm of Hannevig & Johnsen. A third contract was offered, but was withdrawn in the absence of bids, while two charters, which were scheduled for the auction, were fixed privately before the sale. It was the first ship auction ever held in New York, with the exception of marshals' sales.

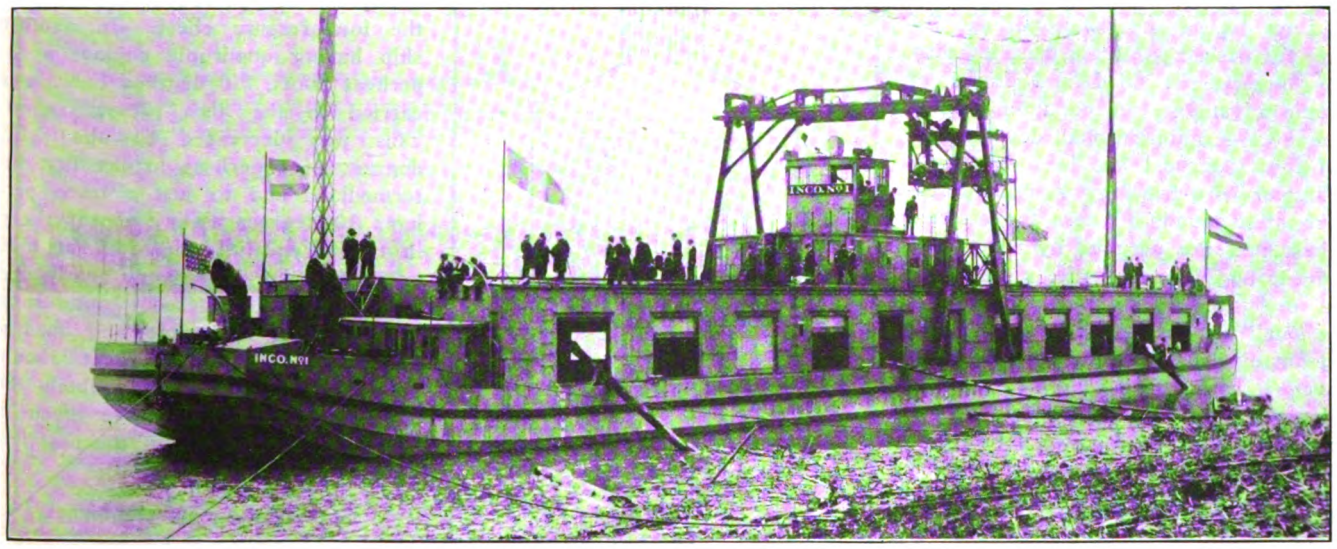
More than 100 shipping men attended. The first contract offered was for a motor tanker, 4,760 tons deadweight, delivery about Aug. 31, which was described in *The Marine Review*, December, 1915. This was sold to Max Strauss, the only bidder, for $500,000. The name of the purchaser for whom Strauss was acting was withheld, but the statement was made that the purchase was made for Norwegian interests.

The second contract to be offered was also for a motor tanker for delivery May 31, 1917, equipped with Parson's geared turbine engines, but in other particulars a duplicate of the first one sold. No bids were received, and the contract was withdrawn from the sale. The third contract, for a cargo freight vessel, 7,500 tons, was sold to the Universal Transportation Co., New York, for $600,000. This ship will be delivered in July, 1917. It was announced that a similar sale would be held frequently, if their success warrants.

While this is the first ship auction to be held at New York, such sales have been customary for many years in England and also in Hamburg, where they have been highly successful. A reason offered as favoring the auctions' success at this time is the shortage of tonnage and the high prices which vessels command. The following are the specifications of the contracts which were sold:

Contract with Baltimore Drydock & Shipbuilding Co., Baltimore, 4,760 tons deadweight motor tanker, delivery about Aug. 31, 1916, $500 daily penalty to owners. Length over all 306 feet, beam 47 feet, depth molded 28 feet, building under Lloyds Special Survey and to class 100 A-1 Lloyds, equipped with three Bolinder engines 500 to 600 horsepower, which will enable the boat to make at least 11 knots loaded; fuel oil consumption will be about eight tons per 24 hours. Contract insured.

Contract with Seattle Drydocks & Construction Co., to build 7,500 tonner, length over all 394 feet, breadth 53 feet, depth 29 feet 3 inches, height between decks 8 feet, loaded draft 23 feet 6 inches, cubic capacity grain, 380,000 cubic feet; water ballast about 1,300 tons; triple engines, 2,500 horsepower; 9 winches and 12 derricks, about 48 feet long, 5 tons capacity. Building under Lloyds Special Survey and to class 100 A-1. Delivery July, 1917, $100 penalty to owners. Contract insured. Speed guaranteed 10½ knots loaded, hull and engines guaranteed for three months.



INCO THE FIRST LYING IN THE RIVER IMMEDIATELY AFTER COMPLETION

Captain John MacMillan died April 28 at the Marine hospital, in Chicago, after an illness of one day. He had completed his first trip this season from Buffalo to Milwaukee on the freighter SENECA. He built and sailed the yacht MARIGOLD and has been in charge of DOLPHIN and MANZANITA. He was 55 years old and a bachelor.

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Marine Use of Superheated Steam

An Interesting Explanation of the Theory and Practice of the Superheater and an Account of Its Operation

By Henry B. Oatley

OF LATE years superheated steam has attracted wide attention among marine engineers; and at the present time is accorded a prominent place, especially in the calculations of foreign ship owners and builders. Superheating is largely a question of degree or amount. For the purposes of this article the following divisions will be made:

Low superheat, zero to 50 degrees Fahr. Moderate superheat, 50 degrees to 125 degrees Fahr. High superheat, 125 degrees Fahr. upwards.

Low degree superheat, perhaps being the easiest to obtain, has, in many instances, been tried and found of some advantage. A common, and in some cases unintentional, development of low superheat has been by throttling or wire-drawing. A boiler pressure of 10 pounds or more above steam chest pressure permits, by wire-drawing through the throttle, a reduction in moisture, and if the moisture is in small amounts, slightly superheated steam may actually be obtained; however, if some distance exists between the throttle and the steam chest, radiation losses will cause a loss of a part, or all, of the superheat.

Effect of Temperature Changes

Low degree superheaters are generally exposed to relatively low temperature gases. In such cases a change in the gas temperature becomes a point more to be considered than where the gases are at high temperatures. The difference between the gas and the steam temperature is, of course, small and a reduction in gas temperature which might be occasioned for example by opening the fire door, would easily bring the gas temperature below the steam temperature. If such a condition existed, the superheater would become a condenser, that is, it would give up heat to the gases. This should, of course, be guarded against. It should also be considered that, below certain temperatures, gases deposit soot in large quantities. This may be quite easily appreciated by those who have operated feed water heaters or "economizers", many of these being provided with tube-scraping arrangements, either manually or automatically operated, which are intended to remove accumulated soot, thus enabling the apparatus to be operated at its designed efficiency.

Moderate superheat has, during the last 20 years, been more widely used. Superheaters developing between 50 and 125 degrees of superheat have been constructed in a multitude of ways, and have been operated with a greater or less degree of satisfaction, but, in marine service at least, have not obtained any uniform degree of application. This is particularly true of fire-tube boilers, as compared with water-tube construction.

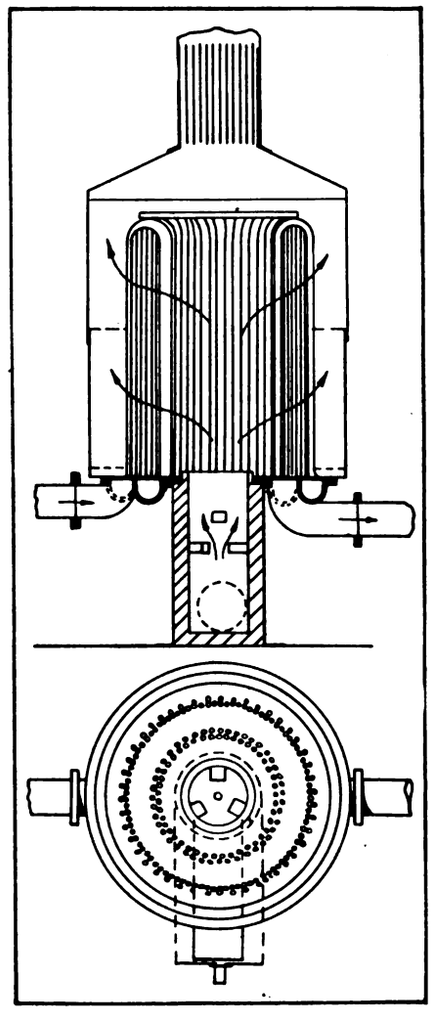

FIG. 1—WATKINSON TUBULAR SUPERHEATER

High degree superheat has, during the past 10 years, been meeting with pronounced favor in merchant service, as well as in naval construction. This statement is believed to apply much more to England and continental countries than to the United States.

In some tests recently made it was found that on a triple-expansion engine having 180 degrees of superheat in the high-pressure chest, 100 degrees of superheat was carried through to the intermediate chest. This practically all disappeared before reaching the low-pressure chest. In another ship having quadruple engines a superheat above 210 degrees Fahr., was carried to the high pressure chest. This was decreased to about 125 degrees of superheat in the first intermediate, and to just a trace, perhaps 10 degrees Fahr., of superheat, in the second intermediate, the low-pressure steam being very nearly dry. This point is considered of interest as showing that for triple and quadruple engines high superheat should be used if it is desired to obtain the large economies which are given in the tests reported within the past few years.

Superheating Development

To say that superheating is almost as old as the use of steam, and that it was from very early times known to be extremely efficient, is probably stating a platitude. Technical literature, in many branches of engineering, has referred at length to Watt, Hirn and others, who many years ago worked assiduously to find satisfactory methods by which they could obtain and utilize this desirable quality in steam. In 1859 technical writers advocated strongly the use of superheaters and pointed out the advantages to be attained, some reference being made to difficulties experienced at that early date. It was not lack of knowledge, but rather the lack of suitable materials and also methods for manufacturing steam containers, which prevented the widespread adoption of superheated steam. Watt had no steel mills nor high-grade steel foundries from which to obtain the necessary plates, tubes, castings, etc., with which to build

From a paper read before the Society of Naval Architects and Marine Engineers. The author, Henry B. Oatley, is chief engineer, Locomotive Superheater Co., 30 Church street, New York.

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satisfactory superheating apparatus. These limitations prevailed, to a great extent, till within 15 or 20 years ago, and, naturally, retarded the growth of the superheater and prevented the development of apparatus which could be cheaply constructed, efficiently operated, and easily maintained at a minimum of cost.

Design of Details

Another factor, which should not be overlooked, was that engineering practice has been relatively crude in respect to the design of details which were in contact with the steam. Cylinders, liners, valves, etc., were, in many instances of a quality of material which was not always entirely satisfactory, even for saturated steam. These conditions led to the improvement of details, not so much with the idea of adapting them to superheated steam as of making them reliable under saturated steam operation. Many details, thus improved in the past 20 or 25 years, have been found entirely satisfactory for superheated steam. Other details have required, with the widespread use of highly superheated steam, still further improvement. It may be accepted that, at the present time in marine practice, satisfactory service can be obtained from existing designs of details when they are called upon to be in contact with superheated steam at temperatures up to as high as 625 degrees Fahr.

The present tendency with regard to superheating is towards an increasing amount. This is true not only in marine practice, but also in locomotive and stationary engineering. It may be a matter of some surprise, to marine engineers generally, to note what is actually being accomplished with the higher degrees of superheat. The last decade has witnessed a wonderful advance in the adoption of high degrees of superheat on locomotives. About 40,000 locomotives throughout the world, of which more than 13,500 are in the United States and Canada, are today operating with temperatures in the steam chest above 600 degrees Fahr. Some roads in this country are using 700 degrees temperature, while in France a large number of engines are operating daily and with wonderful success, at temperatures between 750 degrees and 800 degrees Fahr.

Superheat Rapidly Adopted

In stationary practice the adoption of superheat has been very rapid, and a large number of plants in the United States use at least 150 degrees of superheat. In marine practice during the last 15 years, over 1,200 ships have been fitted with superheaters, all using 150 degrees of superheat, the majority of which are operating with practically 200 degrees of superheat. It is not exaggeration to state that, at the present time, well over 2,000 steamers use superheated steam, the majority operating with what we have classed as "high superheat". In reality, the adoption of superheated steam is world-wide, and is permeating nearly all branches of steam engineering.

Aim in Superheater Design

In the development of a superheating apparatus there are a number of points which should be ever present in the mind of the designer. Efficiency in design is basic. Upon this success or failure of any apparatus must be eventually determined, and without it a low-priced device is of no value. In a great many instances a high efficiency has been offset by one or more of the three points which will be discussed below.

"For efficient superheating," declares one authority, "the tubes should be small, or, if large, should be fitted either with cores to form a thin annulus of steam or with deflecting plates to rotate the steam and throw the heavier and colder particles against the hot tube."

Another fundamental widely accepted by designers is for a high velocity of steam past the superheating surface. One writer says: "Rapid relative movement of the heat-delivering and

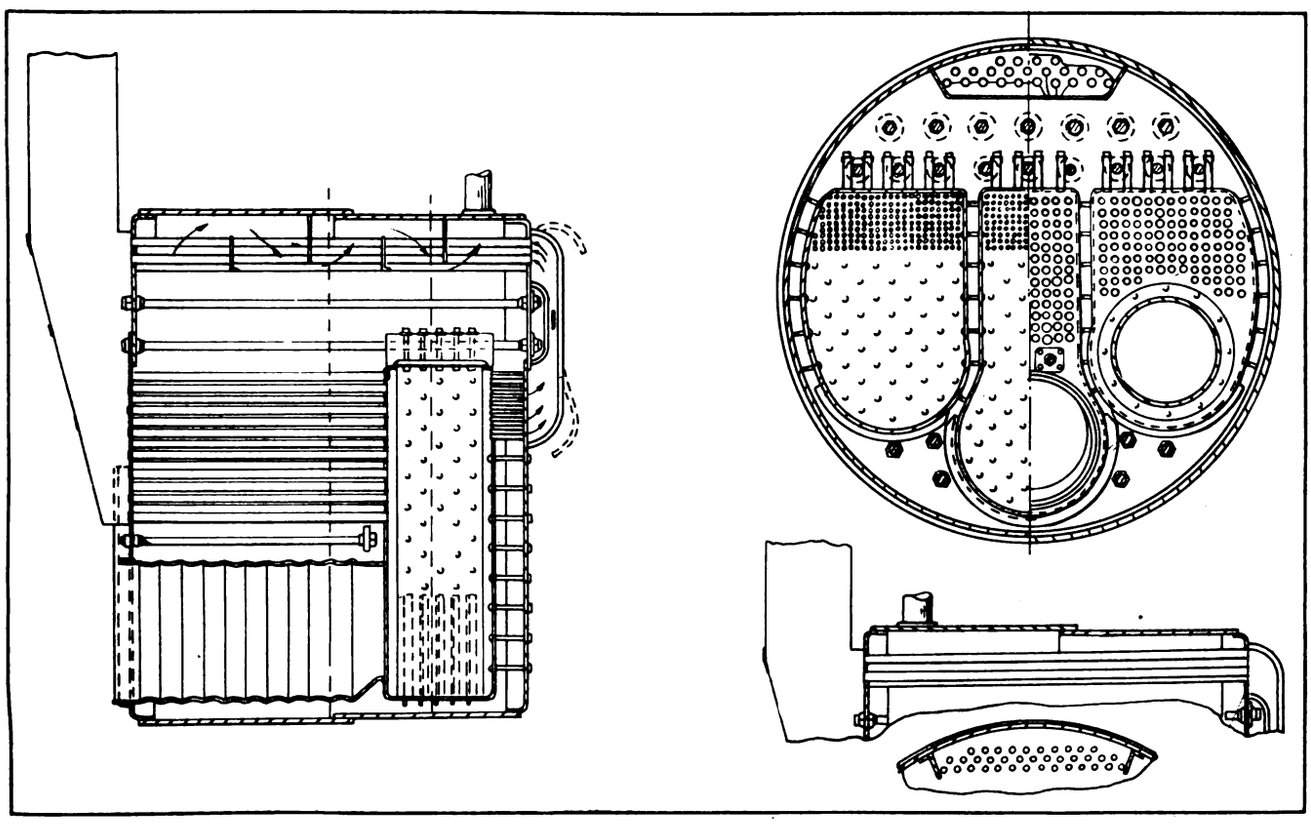

FIG. 2—LOVEKIN "SUPERHEATER BOILER"

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heat-receiving surfaces increases the rate of heat-transfer, because this movement keeps the temperature difference at its maximum."

Simplicity is perhaps an easy problem. All superheaters are, in a sense, simple as compared with apparatus that has moving parts. Simple construction is directly of value, in that it generally prevents excessive cost. This latter may appear either as first cost or installation cost. In either case it represents less money to be invested, and thought and study are required to make such investment a minimum.

Accessibility demands much of the ingenuity that the designer possesses. An efficient and simple apparatus would be discarded, were it so inaccessible as to prevent inspection, renewal and repairs. Durability, which is, of course, another way of saying "long life", is a basic requirement. Failure to provide this has caused the abandonment of a great number of superheater designs. The nature of the work which the superheater has to do requires its parts to be subjected to varying temperature conditions, both from within and without. Action upon the material of the superheater, from the products of combustion as well as from the steam, and, in some designs, from intermittent applications of water, has proved destructive.

Conductivity Must Be Constant

Superheaters are subjected to relatively high gas temperatures, and any change in the heat-transferring ability of the superheating surface will be towards a reduction in its efficiency. This, in turn, will mean an increase in the temperature of the metal, with a consequent weakening. Tubes which are subjected to internal pressure are better able to resist deformation than those subjected to external pressure. In general, it may be said that all of the widely adopted and successfully used superheaters have had one point in common, that superheater pipes are subjected to internal pressure. This has appeared to be a starting point in the minds of all designers, probably from the standpoint of safety.

The modern tendency towards high degrees of superheat has, of course, meant subjecting superheating apparatus to higher gas temperatures. On first thought this would appear to aggravate destruction of the apparatus, as there are limiting temperatures above which oxidization of all usable materials would take place. Experience, however, has shown the builders how far they may go without harmful results, and progressive designers have taken full advantage of this knowledge. It is, of course, evident that, were many restrictions removed, different materials could be used and some advantages obtained thereby. Practical considerations have required compactness in the apparatus, which undoubtedly adds some cost by making it advisable to use high-priced material.

Life of the Superheater

From information obtained it appears that a well-designed superheater, even one that is developing high degrees of superheat, has at least a life as long as that of the boiler tubes. Many instances have come to the attention of the writer where the life of some of these superheaters is above eight years, and in some cases 12 years, without repairs of any extent. It would seem not at all unreasonable

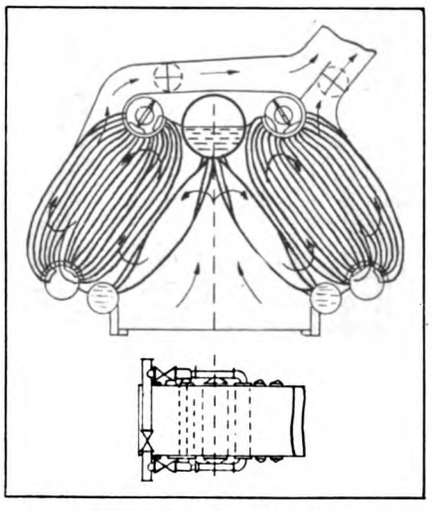

FIG. 3—TUBULAR SUPERHEATER

to expect superheater equipment to have a life practically as great as the boiler itself. If this is obtainable, many of the objections to superheating should be removed. In many cases, even if the life of the equipment were less than eight years, but where fuel economies of 10 per cent and upward were obtained, there would still be considerable on the credit side of the account.

Superheaters may be broadly classified on the basis of their location as follows:

Separately fired superheaters, those subjected to gases coming from a source other than the furnaces of the main boilers.

Waste-gas superheaters, those subjected to gases on their way from the boiler to the stack.

Live-gas superheaters, those subjected to gases which have not left the main-boiler evaporating surface. The superheaters in each of the three classes above mentioned may be and have been, constructed on one of the two structural methods: tubular or cellular. By tubular is meant a construction which requires the steam to pass through tubes for a greater part, or all, of its path during which heat is added. By cellular is meant a construction which requires the steam to pass through a chamber, usually of irregular shape and to receive heat from gas flowing through tubes which pass through the steam chamber. In other words, with the tubular construction steam is carried inside the tube, which is subject to bursting pressure, and with cellular construction, gas is carried inside the tube, which is subject to collapsing pressure.

Schmidt, about 1896, built a number of tubular superheaters, and Watkinson, a few years later, constructed several different superheaters of this general type. Fig. 1 illustrates Watkinson's tubular design.

Separately Fired Superheaters

Separately fired superheaters have their advocates and opponents. It is not difficult with such construction to divide the superheater into parts. This makes possible an "initial" superheater with one or more "intermediate" superheaters. These intermediate superheaters may be termed "reheaters", and there are certain advantages in superheating steam between the different cylinders. On the other hand, such a construction necessitates a very much longer path for the steam, which may result in greater losses in pressure than would be the case in a single high-degree, initial superheater. Separately fired superheaters, on shipboard, require space which can generally be otherwise used to advantage. Then, too, there are heat losses from this type of superheater, as it cannot use all the heat generated in its furnace. Fig. 3 shows another form of separately fired tubular superheater, in general resembling a torpedo-boat boiler. This was installed in a number of ships, but the writer has been unable to find the date on which this design first appeared. There can be no doubt as to this construction developing comparatively high degrees of superheat.

Waste-gas superheaters have appeared in a large variety of forms. Perhaps the two most commonly known in connection with fire-tube boilers are the Watkinson and the Foster. The latter is a U-shaped pipe with separate saturated and superheated headers. It has been modified in its detail by the introduction

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of a core, causing the steam to flow in a thin layer between the core and the pipe. The outer surface of the pipe has also been provided with corrugations, for the purpose of protecting the pipe against corrosion, and of affording greater heat absorbing surface. Improvement in the means for attaching pipes to the header is likewise provided in this design. It should be noted that the introduction of the core causes two changes in the steam section in each unit. It would appear that still further improvement is possible in this respect, by making the core continuous through the length of the element. Fig. 2 shows the Lovekin "superheater boiler", which is of the waste-gas, cellular type.

Live-gas superheaters, which were first brought out by Schmidt in 1898, are illustrated in Fig. 4. This particular design is termed the "fire-tube type", as the superheater unit is introduced into the boiler tube. It is claimed that more than 1,500,000 horsepower of marine engines are being supplied with highly superheated steam from apparatus of this design. Considering the location of the units in this design, any desired degree of steam temperature could be obtained. The Babcock & Wilcox superheater has been especially designed for, and applied to, many forms of water-tube boilers. Its construction is quite similar to the Watkinson and Foster designs, so far as its basic principles are concerned and the writer assumes that it could, if desired, be applied as a waste-gas superheater to fire-tube boilers.

Engine Conditions With Superheated Steam

Reference was briefly made above to the handicap under which the older engineers labored in not having suitable materials for superheater construction. They had further obstacles to overcome in not having suitable designs of various engine parts. Among the details, aside from the superheater, which require investigation if superheated steam is to be used, are steam pipes, valves and fittings, steam chest valves, engine cylinders, liners, etc., piston rings, rod packings and cylinder ratios. Steam pipes, stop valves and fittings should contain no copper or brass. Many governmental regulations also prohibit cast iron and malleable iron. The rules of the United States steamboat inspection service require steel, where "pressures of more than 300 pounds and a temperature of more than 425 degrees Fahr." are used. This requirement is adhered to in the practice, both here and abroad. Steam pipes and flanges should be well insulated. This is, of course, good practice whether the steam is saturated or superheated, but lack of such insulation, when an investment has been made in the superheater, is a cause of wastefulness that ought not to be tolerated. The main stop-valve should have a cast-steel body, and the valve spindle should be of steel.

Affects Design of Valves

Steam chest valves on the high-pressure cylinder should be of the piston type with rings, wherever the degree of superheat is sufficient to eliminate all condensation through the first cylinder. Balanced slide valves on high-pressure chests have been, in some instances, satisfactorily operated,

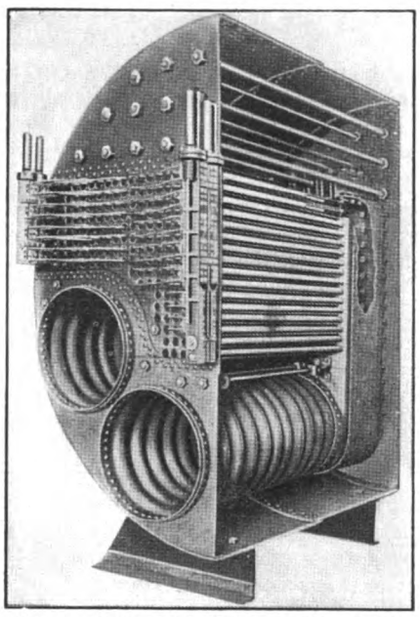

FIG. 4—SCHMIDT FIRE-TUBE SUPERHEATER

but, as a rule, if the temperature of the steam is 500 degrees or more, piston valves are generally recommended. For the intermediate chest of triple and quadruple engines, or the low pressure of compounds, piston valves are desirable, but well-balanced slide valves, if properly provided with grooves for oil lubrication, have been successfully used. For the low-pressure chest of triple and quadruple engines, it would appear safe to use slide valves. The steam temperature, even with high initial superheat, to which the low-pressure valves will be exposed is but little, if any, above saturated steam operation.

Engine cylinders and liners must be of first-class, close-grained cast iron, as hard as can be worked. Iron, as a material, for these details has been proven to be entirely suitable for high superheat. It is well known that cast iron does not lose strength, but on the contrary the strength increases slightly when exposed to temperatures up to about 800 degrees Fahr. It is probable that under exceptionally high temperatures, cast iron may "grow", but, within the range of temperatures to which steam chests and cylinders are subjected with superheated steam, no appreciable change will be found. If this were really a serious matter the number of superheated steam marine plants would not be increasing at the present rate. No fear need be entertained, therefore, that there will be deterioration of these parts, due to steam temperatures up to 650 degrees or 700 degrees. That this is borne out by facts will be indicated by the satisfactory operation of steamships and locomotives using superheat in excess of 200 degrees, as referred to above. In these instances, steam chests, cylinder bushings and cylinders are made of cast iron. Furthermore, in American locomotives, cast iron is almost exclusively used for the steam pipes leading from the superheater headers to the steam chest.

Type of Piston Rings Required

Piston rings cylinder packing should be of strong, hard cast iron. There are several designs of piston packing rings on the market which are reported as giving good satisfaction on marine engines using 200 degrees of superheat. These designs are also applicable for valve rings. Rod packings, for high-pressure piston and valves, as now arranged are durable and satisfactory. Trouble was hitherto experienced in obtaining the proper designs of rod-packing, but this is no longer the case. It is the author's understanding that there is a growing tendency towards the use of soft cast iron instead of white metal in these rod packings, and it is claimed to meet all the requirements. If such is the case our ideas of this detail may have to be revised.

Cylinder ratios to be suitable for use with highly superheated steam require consideration, on account of the steam characteristics. The published dimensions of English and German superheated steam ships show that a lower cylinder ratio is used. This is generally accomplished by increasing the diameter of the high-pressure cylinder, the intermediate and the low-pressure diameters, on a triple job, remaining as before. In quadruple engines, the high and first intermediate-pressure cylinders are increased in diameter, while no change is made in the second intermediate and low-pressure cylinders. In converting saturated engines to the use

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of superheated steam, an increase in the high-pressure cylinder diameter is not always advisable, and many times not possible. In such cases, if the same indicated horsepower is to be obtained, it is necessary to increase the cut-off in the high-pressure cylinder, thus giving an increased volume of steam at cut-off, and, in effect, decreasing the cylinder ratio. If the volume at cut-off is not increased the indicated horsepower will be slightly decreased, assuming, of course, that the boiler pressure is not changed.

The operation of engines using superheated steam is but very little different from saturated steam operation. The two chief points under this topic are starting up and lubrication. In starting up, particularly with new engines, or if new liners or rings have been applied, nearly all superheater manufacturers recommend that saturated steam be used for a short time. After the engines are well heated, the mixing-pipe valve may be partly closed and the temperature of the steam in the high-presusre chest gradually raised. When the vessel is on a run, some hours should elapse before the full degree of superheat is used.

The Problem of Lubrication

Lubrication is probably the most prominent point in mind when first considering the use of superheated steam. In reality this need not cause apprehension. With low degrees of superheat, it is not always necessary to use any oil internally. This may be explained by the fact that the superheat is not sufficient to carry the steam through the high pressure cylinder without condensation. Where condensation occurs oil lubrication may not be necessary, and this is particularly true when low pressures are carried. Low superheat really does little more than eliminate part of the initial condensation. With moderate degrees of superheat opinions differ as to the necessity for the use of oil. Cases are on record where a superheat of more than 100 degrees has been successfully taken care of without internal oil lubrication. It seems probable, however, that in such cases heavy swabbing of rods was resorted to. When high degrees of superheat are considered, lubricating oil should certainly be applied internally. The quantity of oil needed to satisfactorily take care of 150 or more degrees of superheat is probably imagined as being greater than what is actually required. The average of a large number of boats using high degrees of superheat shows that very favorable results were obtained with about 0.3 gallon of oil per 1,000 horsepower per 24 hours. The keynote of the lubrication question with highly superheated steam is that a regular supply rather than a large quantity of oil is required. The oil furnishes the lubrication previously afforded by the water present in the saturated steam, but it does not follow that a regular supply of oil means a large quantity of oil.

Necessary Equipment

Equipment to handle superheated steam, some of which may not be considered for saturated-steam installation, is confined to lubricating-oil pump and pipes, filters, pyrometers, and mixing pipes for leading saturated steam to main steam pipe and superheated steam to auxiliary steam pipe. An oil pump, driven from some convenient part of the engine, is required to feed oil in a steady and regular manner. Inexpensive pumps are on the market, and are reported as being reliable in service. Many of them are so arranged that the oil container is not under pressure, thus permitting a renewal of the oil supply without trouble or danger. In modern practice, the oil is introduced into the steam pipe between the throttle valve and the engine. The delivery end of the oil pipe fitting extends into the steam pipe, so that the current of steam entrains the oil and it is atomized before reaching the wearing parts.

Filters are, of course, necessary where there is any possibility of oil being taken into the boilers. A large proportion of steamers using saturated steam in condensing engines are at present equipped with filters. It is believed that in a good many ships the filtering apparatus now installed, particularly with proper attention given to cleaning, is adequate to prevent oil reaching the boilers. A number of recently built ships, using high superheat, have had two filters arranged in series, and reports from engineers on such boats indicate that oil does not get into the boilers so as to cause any damage or give trouble.

Pyrometers are desirable for measuring the temperature of the steam at various points. It appears, at the present time, common practice to have one pyrometer indicating the temperature of steam at the engine stop valve, also to have other pyrometers at points nearer the superheater for indicating the temperature of the steam where it leaves the superheating apparatus. A pyrometer to register the temperature of steam in the intermediate-pressure chest is also frequently applied. Various types of pyrometers which measure these temperatures accurately are available and are reliable instruments; the electric pyrometer, especially, appears to have been developed in a satisfactory manner for marine practice. The information given by the pyrometer is important, and makes it possible to determine how far superheat is being carried through the engine, and whether any boiler is being properly or improperly fired. By showing a reduction in steam temperature, the pyrometer gives warning of an impending fall in boiler pressure; in other words, it acts as a danger signal as regards pressures.

A small diameter mixing pipe is generally provided, so that saturated steam can be taken from the boiler directly to the main steam pipe leading to the engines. The use of this pipe has been criticized in some quarters on the ground that the proportion of steam flowing through the pipe, if adjusted for a certain condition of maximum load, will, at other loads, permit a different quantity of steam to flow through the pipe, and the temperature of the engines will fluctuate. It is further contended that at light loads too much steam will pass through the mixing pipe, having a tendency to short circuit the superheater, in which case the superheater pipes may become overheated.

Economy of Superheat

Auxiliary machinery may be more economically operated when superheated steam is available. Pipes for accomplishing this may be arranged so that the desired amount of superheated steam can be led to the auxiliary steam line, the quantity depending on the kind of machines to be operated, the distance of these machines from the mixing pipe, and the severity of weather. If auxiliary machinery is fitted for the full degree of superheat obtainable, maximum economies are, of course, possible. If the machines are not arranged for superheated steam, there is still opportunity of effecting considerable saving by feeding enough high-temperature steam into the auxiliary line, to carry practically dry or even slightly superheated steam up to the auxiliary engines. With long pipe lines leading, for instance, to steam winches operating in cold winter weather, the economy in steam which is obtainable will be very readily appreciated. Winches thus provided will use steam instead of a very high proportion of hot water. In fact, the percentage of economy, by using thoroughly dry steam, in auxiliary machinery will

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be greater than obtained on the main engines. The combination of turbines and highly superheated steam should meet with much more favorable reception than has been accorded, until recently, to highly superheated steam in reciprocators. This may be attributed to the fact that internal lubrication, piston rings, valve rings, rod packings, filters, etc., do not require consideration, due, of course, to the character of the prime mover. It is understood that a large percentage of the turbine ships now under construction abroad are equipped for superheated steam. To the writer's knowledge, there are now building in England eight geared turbine ships ranging from 3,600 to 10,000 shaft horsepower, averaging about 5,500, which are to be equipped with superheaters. It is probable that the degree of superheat used will be from 125 degrees upward. Geared turbine installations with superheated steam are receiving considerable attention in the United States. Thousands of horsepower of turbines in shore installations are operating with moderate and high degrees of superheat, without and trouble.

What will be the advantage, and what has the ship owner to find of interest and value by installing superheaters? Briefly they appear to be fuel economy, water economy reduced valve leakage, increased boiler capacity and increased revenue cargo space.

Saves 8 to 15 Per Cent of Fuel

Fuel economy cannot be any less important in the future than it is today. If any change in fuel costs takes place, they will go up rather than down, and, as they increase, the question of fuel saving will become more pressing. With the use of reciprocating engines, superheating presents practically the only source of further pronounced economies that is left to the engine designer.

We hear railroad men talking eloquently and continually of fuel economies of 25 per cent, 30 per cent, and in some cases 35 per cent. To expect these in marine practice is, of course, out of the question. The marine engine as it stands today is a much more efficient and economical plant than the railway man has had available.

Superheating, therefore, has permitted a higher percentage of economy on the railways than is possible in marine practice. It may, however, be concluded that, assuming 150 degrees of superheat at the high-pressure chest, the following fuel economies may be confidently expected in average practice: Compound engines, 18 per cent; triple expansion engines, 15 per cent, and quadruple expansion engines, 8 per cent.

Water Economy

Water economy is obtained wherever we get fuel economy. In percentage, the economy in steam will be greater than in fuel. An 8 per cent fuel economy by superheating gives 10 per cent and upward of steam economy. It will be readily appreciated that an economy of steam of this amount is directly of advantage in reducing boiler maintenance, as the quantity of water to be evaporated is decreased. The work demanded of the evaporators and of the feed water pumps and condensers is also decreased.

Leakage past piston and valve rings is a great source of loss. It has been demonstrated that water leaks more readily than steam, and that the heat loss is greater. This accounts, in part, for a greater water than fuel economy in using superheated steam.

Boiler capacity as an asset is real, but rather difficult to express in figures. What is meant by boiler capacity in this sense is that, assuming a given power with saturated steam and applying a superheater, the same indicated horsepower is obtainable with, say 8 per cent less fuel and 10 per cent less steam. If, for any reason, it is desired to force the boilers and engines, and to burn the same amount of fuel as with the saturated steam, the output measured by engine horsepower will be increased more than 10 per cent. Of course all ships may not have engines capable of developing this increased output on demand, but a great many do. For ships which have boilers relatively small in comparison with the engines, there appears to be great possibilities in fitting them with superheaters.

Greater revenue cargo is obtained by virtue of the fact that decreased tonnage of bunker coal is required for a given voyage. The saving in dead cargo can be converted to paying cargo. The added income from this source should be considered in connection with the possible use of superheated steam.

It is the writer's opinion that the situation, as regards superheaters and the use of highly superheated steam, may be summed up by stating that designs suitable from the standpoint of efficiency, simplicity, accessibility and durability are available for ship owners. Also that the difficulties which discouraged the earlier designers have been overcome as regards detail designs and operating conditions, and, therefore, the installation, operation and maintenance of high degree superheaters appears to be not only possible, but practical and beneficial.

There is at present a total of over 1,500 ships using superheated steam, aggregating indicated horsepower of 2,300,000. Is it then too much to expect that the American merchant marine will, in the next few years, very actively take up the question of superheating steam? And it seems reasonable to expect that a few years will find us comparatively abreast of English and continental ship builders in regard to this very important means of reducing operating expenses.

Book Review

The Marine Steam Engine, by Richard Sennett and Henry J. Oram; 502 5¾ x 9-inch pages; cloth; published by Longmans, Green & Co., and furnished by *The Marine Review* for $6.00 net.

The twelfth edition of The Marine Steam Engine is a revision of the preceding editions to conform with the policy of keeping up with the times pursued by the late Richard Sennett and his co-author Henry J. Oram.

The opening chapters describe the development of the marine power unit from the time of Fulton's paddle wheel propelled CLERMONT to the present era of transatlantic liners equipped with turbine driven twin and quadruple screw propellers. The following chapters deal with the theory and practice of fuel combustion and go into a deep discussion of boiler design, economy of fuel, and the use of petroleum as fuel. The theory of the expansion of steam, the methods of increasing the expansive efficiency of steam and a description of compound engines are treated in the next few chapters. Under the subdivision "Mechanism" is found an exhaustive discussion of valve gear, reversing devices, arrangement of cylinders, details of engine room fittings, and the steam turbine adapted to marine service. The subject of propulsion with co-efficients and curves of performance, and descriptions of paddle wheel and screw types is treated in four chapters.

The auxiliary features of the engine room are treated with special emphasis upon the pumping, fire and flooding arrangements and their accompanying machinery. The operation of engines under way, the firing of the boilers for fuel economy and the overcoming of defects developed are subjects treated in such a way that engineers and students of marine engineering will find this feature of great value. Charts, diagrams and tables are used extensively as an aid to the text throughout the book.

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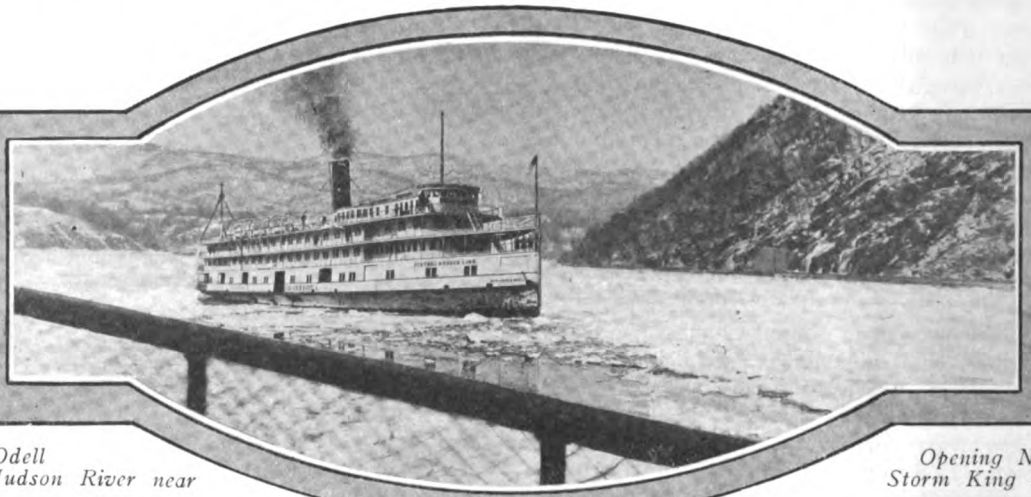
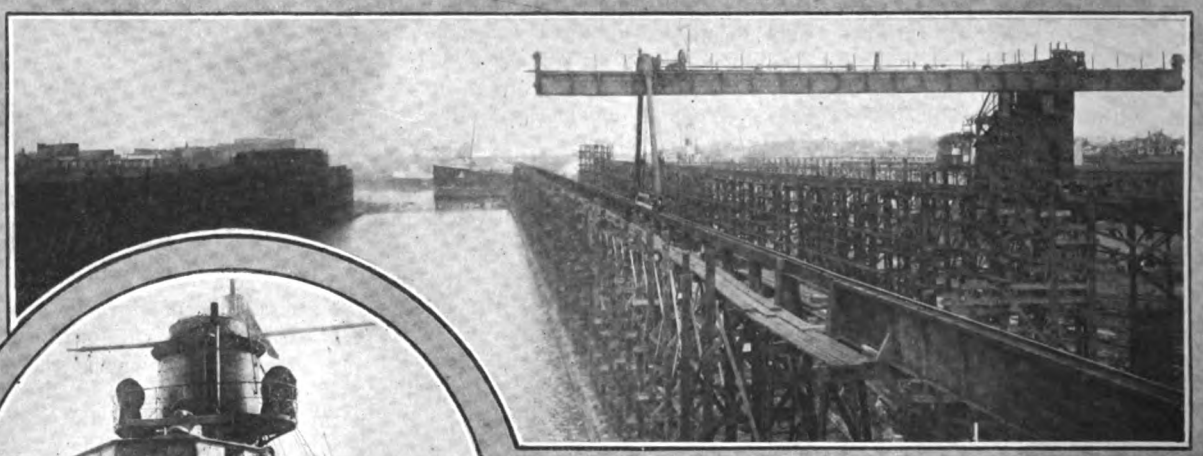
Latest Marine News in Pictures

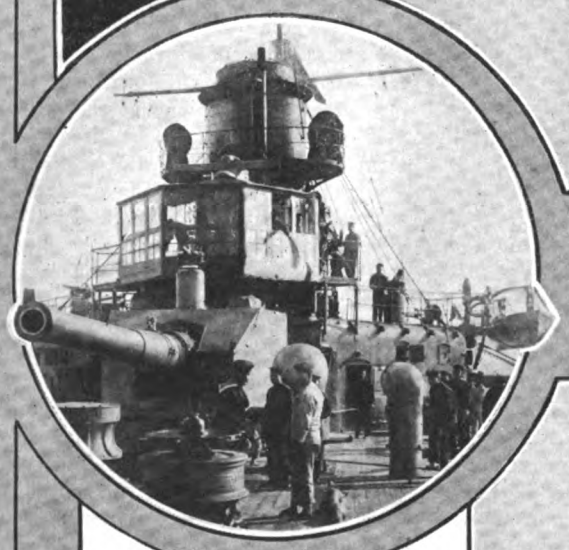


Steamer Odell on the Hudson River near Storm King Mountain

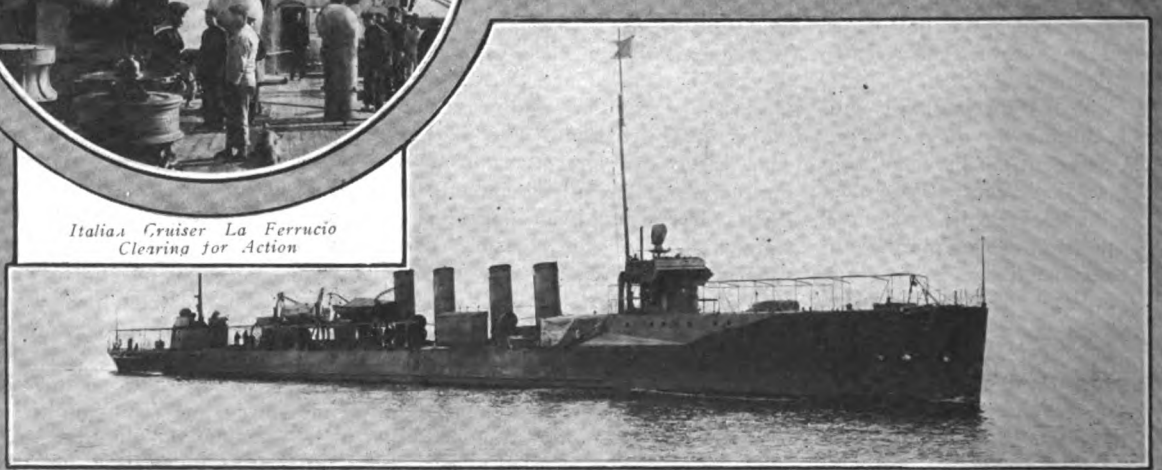
Opening Navigation



Lorain Plant of the American Ship Building Co., Where the Steamer D. G. Kerr was Launched May 6



Italian Cruiser La Ferrucio Clearing for Action



Destroyer Wainwright, Built by New York Ship Building Co., Can Go 32 Knots

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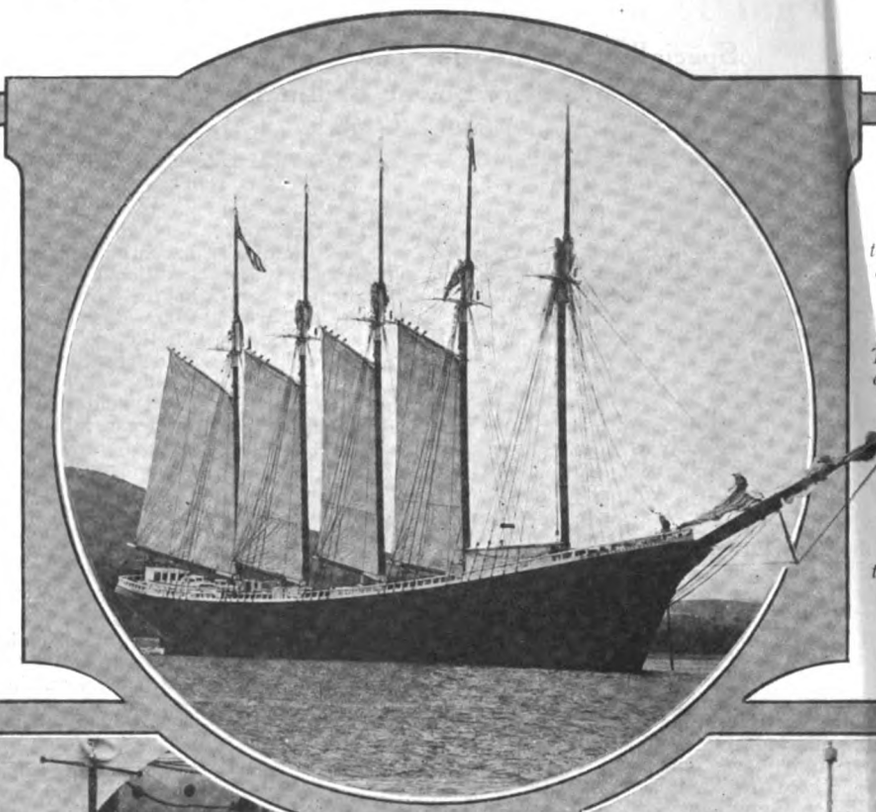
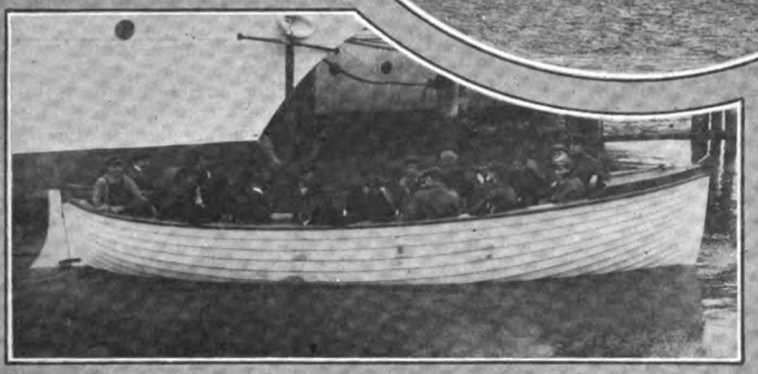
Photographs From Far and Near



The schooner Margaret Haskell, shown at the right, foundered off Hole in the Wall passage, Bahama Islands. The captain, James A. Loesch, and H. B. Hammer, mate, together with eleven men, took to a 26-foot power yawl. The Sterling engine in the yawl ran steadily until the fuel was exhausted, resulting in the rescue of the crew.



A Modern Power Life Boat Undergoing Trial

U. S. S. Achilles at Panama

Loading the first cargo on the first self-propelled barge to carry coal from Birmingham, Ala., to New Orleans, via the Warrior river.

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Late Decisions in Maritime Law

Legal Tips For Ship Owners and Officers

Specially Compiled for The Marine Review

By Harry Bowne Skillman

Attorney at Law

THE EVENTS leading up to the European war are set out in the case KRONPRINZESSIN CECILIE, 228 *Federal Reporter* 946, in an agreed statement of facts. That case was one seeking damages for breach of contract, by a steamship, for failure to carry a consignment of gold from the port of New York to the port of Plymouth, England. It appears that on July 28, 1914, the German steamship sailed from New York for Bremerhaven, Germany, via Plymouth, and that on the evening of July 31, when about 1,000 miles from Plymouth, it changed its course and returned to an American port. The master had knowledge of the historical facts preceding the outbreak of the war occurring before the sailing of the steamer and of facts thereafter occurring, indicating that his country was upon the verge of war with Russia, France and England, and just before changing his course received a wireless from the steamship company stating that war had broken out and directing him to return to New York. It appeared, however, that war had not in fact been declared at that time. The District Court, for the district of Massachusetts, held that the master was justified, and acted with a due regard for the safety of his ship's passengers and cargo and that his deviation from the direct course of his voyage was not a breach of contract with a shipper, though it was claimed that the steamship could have reached Plymouth before war was declared. The court further held that, as the master acted in accordance with the dictates of his own prudence and sagacity, the fact that what he did was with the approval of the shipowner did not prejudice him or the ship. So far as shippers and passengers are concerned, the master was bound to act upon his own judgment, to be exercised in good faith on their behalf, in determining whether to abandon a voyage because of information that war was imminent, and instructions from the shipowners would not protect him.

* * *

In the absence of a showing that it is customary for a ship lying at anchor to maintain her engines and boilers in condition for immediate movement, it cannot be said, as matter of law, that failure so to do is negligence. —Charles Hubbard, 228 *Federal Reporter* 352.

* * *

In CUZCO, 225 *Federal Reporter* 169, the court said: "Ships are regarded as floating portions of the nation to which they belong, and whose flag they fly, and while they are upon the high seas, the jurisdiction of the flag obtains, and the law and rule of decision of the flag's jurisdiction obtain, and all on board are regarded as being on the soil of the vessel's nation, and a tort committed on the high seas is therefore amenable to the law of the ship's flag." The court further held that torts committed on a vessel in the port or harbor of another country is governed, as to the rights of the person injured, exclusively by the law of such country, so that a stevedore, injured through the fault of those in charge of a vessel in a port of British Columbia, the laws of which country do not give a lien for such injury, cannot maintain a suit in rem against the vessel therefore in a court of admiralty of the United States.

* * *

A contractor engaged in widening and deepening a section of the Erie canal, it was decided in Otts vs. I. M. Ludington's Sons, Inc., 229 *Federal Reporter* 454, is bound in the exercise of reasonable care to ascertain from time to time, by dragging or some other suitable means, the depth of water in the canal and the condition of its prism in the locality where he is engaged, in order to avoid interference with navigation. The duty of keeping the canal free from obstruction, or of adequately warning navigators of the danger therefrom, it was said, rested upon the principal contractor, as well as upon the subcontractor, by whose negligence an obstacle to navigation was actually created.

* * *

The Greek vessel, ATHANASIOS, was chartered by a Canadian corporation in a port of the United States to carry grain to a European port, under a charter party exempting from liability for "loss or damage occasioned by arrest and restraint of princes, rulers, or people." While the vessel was at New York and before loading, she was requisitioned by the Greek government under orders received from the Greek legation at Washington. The court decided, in an opinion appearing in 228 *Federal Reporter* 558, that such requisition released the vessel from the obligations of her charter. The court further decided that a court of admiralty of the United States should for political reasons refuse to entertain a suit by the Canadian corporation against the Greek vessel.

* * *

The steamer E. M. PECK, it appeared in the case reported in 228 *Federal Reporter* 481, was moored for the winter of 1903-4 in the Black river at Lorain, O., in charge of an experienced mariner. She was made fast by anchor chains at bow and stern, the bow chains being carried upstream to a sound white oak pile 15 inches in diameter set in solid ground, and then shackled. In January a thaw, with rain, set in, causing the ice to break up, and creating conditions very unusual, if not unprecedented. The harbormaster and the caretaker ran five additional lines from the steamer, but an ice gorge, breaking through a bridge, came down, parted the lines, breaking off the pile to which the bow chain was made fast, and the steamer was swept against a dredge moored below. The court held that those in charge did all that careful, prudent, and experienced men would have done under like conditions, and that the drifting of the steamer was due to inevitable accident, for which no suit could be maintained.

* * *

The anchor of a ship was held in the case of ANGLO-PATAGONIAN, 228 *Federal Reporter* 1014, to be a part of her appliances and under her control, where it appeared that a dry-dock company which was making repairs to the ship had nothing to do with her except to make such repairs, and the ship was, therefore, declared liable for injuries to dry-dock employes, caused by the falling of such anchor because of insecure fastening or imperfections in connection with its construction. This was so, the court held, whether the slipping of the anchor was due to weight upon the break band holding it, or to vibration or jar caused by the work of repairs, or to its actual loosening by some person. The court decided in that case that a riveter 40 years old, married, and having six children, and who had been making from $20 to $25 a week, who suffered a dislocation of his right shoulder, a fracture of the upper part of his arm, a broken ankle, and a partial paralysis of the right arm, was entitled to an allowance of $7,000, that a colored foreman rigger, married, and having two children, whose leg was crushed so as to require amputation, and whose average weekly pay was from $18 to $25, was entitled to an award of $5,500; that an employe in the fitter's department of the ship yard, married, and having one child, and earning $12 a week, and who sustained a fracture of the left thigh and other bruises, was entitled to an allowance of $4,000; that the mother of a colored laborer who died from injuries sustained, was entitled to an award of $2,000, it appearing that such laborer was 25 years old and earned about $12.75 a week, and that the mother was 55 years old.

* * *

Under the United States Compiled Statutes 1913, section 8021, it was said in the case of ALOLA, 228 *Federal Reporter* 1006, the owner of a motor boat, properly manned and equipped, is entitled to a limitation of liability on account of a collision which occurred with a small rowboat without his privity or knowledge.

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In the Traffic Manager's Office

A Review of the Month on Coasts and Lakes—Useful Pointers for the Men Who Get the Business

Efficiency in Harbor Transportation

By Edward F. Cullen

THE whole country has been reading about freight embargoes. We are told that our prominent eastern ports have been piled high with freight that could not be moved on schedule time. The freight congestion, at this writing, chokes New York City's commerce. The railroads find themselves swamped by shipments sent to New York for local delivery, and for export to foreign countries, and it is estimated that 50,000 loaded freight cars have been stalled at New York railroad terminals at one time. Merchants' and manufacturers' associations and chambers of commerce are busy compiling and submitting statistics, holding meetings, forming committees and protesting to the railroads, and then writing letters to their constituents, telling them all about it. The railroads, on the other hand, seem to be doing everything possible to meet the situation. They are granting special free time allowance on cars stalled at terminals, organizing special freight traffic bureaus, and straining every possible point to help both the consignor and the consignee. But nevertheless the freight movement is only about 50 per cent complete and how can it be otherwise until we have ships to carry it away? This condition does not stand alone. We must take into consideration the fact that only non-embargo shipments are coming with any despatch. What are we going to do about this condition and will it ultimately mean the slacking down of our industries? Even though we did have the ships, is the harbor of New York keeping pace with the business of shipping, regardless of whether the present inrush of freight is temporary or for all time to come?

Within the boundaries of our country, embracing more than 3,000,000 square miles, dwell over 100,000,000 people. They live in cities, towns, villages, hamlets and remote farms. They are separated by broad rivers, rugged mountains and deserts. The whole concerted action of this far flung population is dependent upon the movement of our commerce. To this end we have shamefully neglected the rehabilitation of our merchant marine, owing primarily to the apathy of our people.

Such, fortunately, is not the case with our means of inter-communication by rail and waterway, whereby our commerce and industries are united by a marvelous system which is the result of keen foresight and persistent effort on the part of our shipping specialists.

EDWARD F. CULLEN,
President, Cullen Barge Corporation, New York

They have endeavored from the first to provide a means of communication embracing our whole country, connecting every state and every community, to its last individual shipping zone. By this great chain our entire population of shippers has been organized for united action in the matter of national and international shipping movements. In this respect we stand unsurpassed by any nation of the world.

It seems a pity that at this crucial time in the commercial history of our great nation, whose payroll is far in excess of the combined payrolls of the whole world, we should be placed in a position where we are unable to take advantage of international commercial opportunities, owing to a lack of sufficient vessels with which we could move our commerce, once the products of industry reach the principal intercommunication terminals to which our railroads are capable of quickly effecting dispatch.

We are facing more than the lack of a merchant marine. I often ask myself the question whether or not we have sufficient harbor equipment to cause prompt dispatch between railroad terminals and steamships and in answer thereto I believe that I am conservative in making the statement that we are insufficiently equipped in the port of New York by at least several thousand barges and lighters. I also have asked myself the question many times, whether or not the same business efficiency is behind the barge and lighter business as we find behind our big railroads, and I refer more particularly to independent operators.

The history of the barge business particularly in New York, is extremely interesting, and dates back to 1807 when Robert Fulton first placed into service barges whose maximum capacity was about 500 pounds. This type of boat could navigate with safety only in such waters where a pole would reach bottom. Since then, this particular mode of navigation has gradually developed and today it is common to see barges capable of carrying 1,200 tons. With the increase of business, a situation has developed with the lighterage business in New York harbor where independent operators, such concerns as the Cullen Barge Corporation, exclusive of the railroads, say to themselves: "I will build barges enough to take care of my own business, and let the rest do the same." The consequence is much business has developed with no organized service to

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take care of it, except in a very limited way. Therefore, I reiterate new and efficient methods are necessary to meet the demand in the barge business, which has quickly grown to enormous proportions.

It is interesting to note that barge operators have, in one sense of the word, been successful, in that no financial failures worth mentioning have been made a part of our court records, and also that the barge business has been the means of laying the foundation for several fortunes, notwithstanding the apparent lack of co-operative efficiency. I have grown up with the barge interests. I had thoroughly instilled in my mind the old school idea of everybody for himself, and it was not until I had acquired a considerable knowledge of the business that I decided to retire for a few years and study the latest, most modern and efficient methods of other businesses, including some of the largest international concerns. I started at the bottom and did not stop until I had had a thorough schooling from the raw product to the receipt of the finished produce delivered to the ultimate consumer, and with this training I returned to the calling of my family—the barge business, with the idea of applying modern efficiency to the enterprise of harbor communication.

The Details of the Business

I believe that the barge owners and operators who do business on a large scale should know something about supply and demand, manufacturing conditions with reference to shipping, export, packing, steamship operation, stevedoring, and harbor navigation. They should have sufficient tug-boat equipment to insure prompt barge delivery, without actually going into the tow-boat business, so as to avoid detaining a barge an unreasonable length of time before it reaches its loading point after the consignor has concluded charter arrangements, and I further believe that in return for this service, shippers should co-operate with those who expend capital for such additional equipment, and who take the time and trouble to render better service, which means quicker loading and a more prompt get-away of our overseas traffic. It is not at all common for freight to take longer to reach the terminal docks from a given railroad point than it does for that same freight to be shipped from Pittsburgh to New York. For years we have devoted our time at nights, watching and waiting for harbor movements, when if the barges had been available and tow-boats ready, we could have used the time to better advantage. The Cullen Barge Corporation aims to take care of some of these difficulties through a customer's service bureau. This bureau is in charge of a competent operator who has had 15 years experience in directing harbor transportation movements for one of the largest coal-operating concerns in New York. At this operator's disposal is a complete file which contains data of every kind and description with reference to transportation in all its ramifications. Special steel cabinets have been constructed to hold the records, so that they are sure to be both pilfer and fire proof. One of the duties of this operator will be to furnish information to the company's clients on a moment's notice.

I believe the time has come when organization is necessary in the lighterage business, so that we may handle easily and quickly the greatest amount of exports and imports, both now and in the future, that America has ever known.

Grace Plans New Service

W. R. GRACE & CO., New York, will operate a fast fortnightly passenger service between New York and the west coast of South America via the Panama canal, according to an announcement made by the firm recently. The vessels will make Callao in 11 and Valparaiso in 18 days, including calls at Iquique and Antofagasta. The Pacific Steam Navigation Co. has already announced fortnightly departures to the same destination, so that New York will soon be supplied with a fast weekly passenger and express service to the west coast of South America.

Four new steamers are being built at the yards of the Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, for W. R. Grace & Co. The first of these will be delivered May 1, 1917, according to the specifications of the contract, while the other three will be delivered almost immediately thereafter. The service will start at that time. The ships will have a displacement of 10,000 tons and will be capable of attaining a speed of 14 knots. They will be equipped with all modern devices for convenience and safety and will have accommodations for 100 first class passengers.

"The plan is in the nature of an experiment," said J. Louis Schaefer, treasurer of W. R. Grace & Co. "We believe that the field has possibilities for development, particularly with the movement in the direction of extending the trade of the United States with South America, and that the service will prove successful. We will not depend upon tourists to maintain the service, as it is not difficult to recognize that it will be some years, at least, before the west coast of South America becomes a field for pleasure seekers. But increasing trade relations will necessitate the dispatch of commercial travelers to that country, probably in sufficient numbers to warrant the service."

No data has yet been set for the inauguration of the Pacific Steam Navigation company's service, so that it is uncertain whether it or the Grace line will be the first in the field. The position of the former company is made uncertain by the fact that many of its vessels have been commandeered by the British government, and the beginning of the passenger service is more or less dependent upon the return of these ships. The company's present route extends only from west coast ports of South America to the Isthmus, where it connects with the Royal Mail's steamers. Its service in this trade has been partly disrupted as a result of the war.

In addition to the passenger service, the Grace company will continue to operate its present freight steamers on a fortnightly schedule, thus giving the company's ships weekly departures. Approximately 20 vessels are now in the freight service, operating under the American, British and Norwegian flags.

Cunard's Annual Report

The Cunard Line in 1915, earned £1,721,166 16s 4d, this figure including £141,995 19s 7d brought forward from 1914, but excluding a reserve for contingent liabilities arising out of the war. After debiting income tax and debenture interest and reserving £559,062 17s for depreciation of ships and other properties and plant, £1,024,007 5s 1d remain to the credit of the profit and loss account. Of this amount the sum of £350,000 has been transferred to the credit of the repair and renewal fund, £64,423 to the credit of the insurance account, and £250,000 to the credit of the reserve fund. A dividend of 5 per cent, paid on the preferred stock to Dec. 31, 1915, amounted to £56,750. The directors have recommended the payment of a dividend of 10 per cent on the common stock, including the government share, from which income tax will be deducted, together with a bonus of 10 per cent, free of income tax. This leaves a balance of £162,088 9s 1d, which is carried forward to the credit of the profit and loss account for 1916.

The report says: "The company's royal mail steamer LUSITANIA was sunk

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on May 7, 1915, without warning, by an enemy submarine. The company's cargo steamers CARIA and VERIA were sunk by hostile submarines on Nov. 6, and Dec. 8, 1915, respectively, in the Mediterranean, but, fortunately, without loss of life.

"Atlantic passenger movement in all classes during the past year was naturally of a restricted character, and, with the large number of steamers engaged in government work, the company was not in a position to offer the usual facilities to its patrons. LUSITANIA up to the time of her loss, attracted a large share of what traffic was moving. Since that date the company has been greatly assisted in maintaining its weekly mail service to New York by Anchor Line vessels calling at Liverpool. Owing to the submarine menace passenger traffic across the Atlantic during the past year has been diverted to steamers of neutral flags.

"Freights both in the Atlantic and Mediterranean trades have risen considerably on account of the general shortage of tonnage. To maintain its various freight services the company chartered a number of steamers from time to time throughout the year which have been employed between Liverpool and London and ports in North America. The company's regular cargo services to Mediterranean ports and to Havre have been satisfactorily maintained throughout the year.

"The construction of the new passenger and cargo steamer AURANIA at the yard of Swan, Hunter & Wigham Richardson, Ltd., has been and is still delayed by pressure of government work.

"With the view of strengthening its freight services the company has recently purchased five steamers, of which four, renamed VANDALIA, VALERIA, VOLODIA and VINOVIA, have already been taken over."

German Ships Interned in American Ports

GERMANY'S merchant marine is represented by almost one-half million gross tons—65 ships—at various American ports. The aggregate tonnage of these German vessels sheltered in United States ports reaches 488,368 tons, and 12 other ships, belonging to Austrian corporations, also detained at our ports, aggregate 56,713 gross tons.

These ships are not interned in the sense in which the warships of a belligerent are held in our ports, but are simply tied up under the protection of a neutral power until the war shall come to an end. Where merchant vessels fall under suspicion of being put to some use which is in violation of neutrality, steps are taken to place their officers and crews under surveillance. As a rule the status of the German and Austrian vesssl in American ports is not unlike that under ordinary conditions in time of peace. The idea that all these ships are to be seized in case of a break in diplomatic relations is regarded as hasty by officials of the treasury department, under whose charge such "interned" vessels are while in the United States. Only in case of war could these ships be seized. A commander of a German or Austrian merchant vessel in American waters has a perfect right to go to sea if he so chooses and to seek another port where protection from an enemy warship may be had.

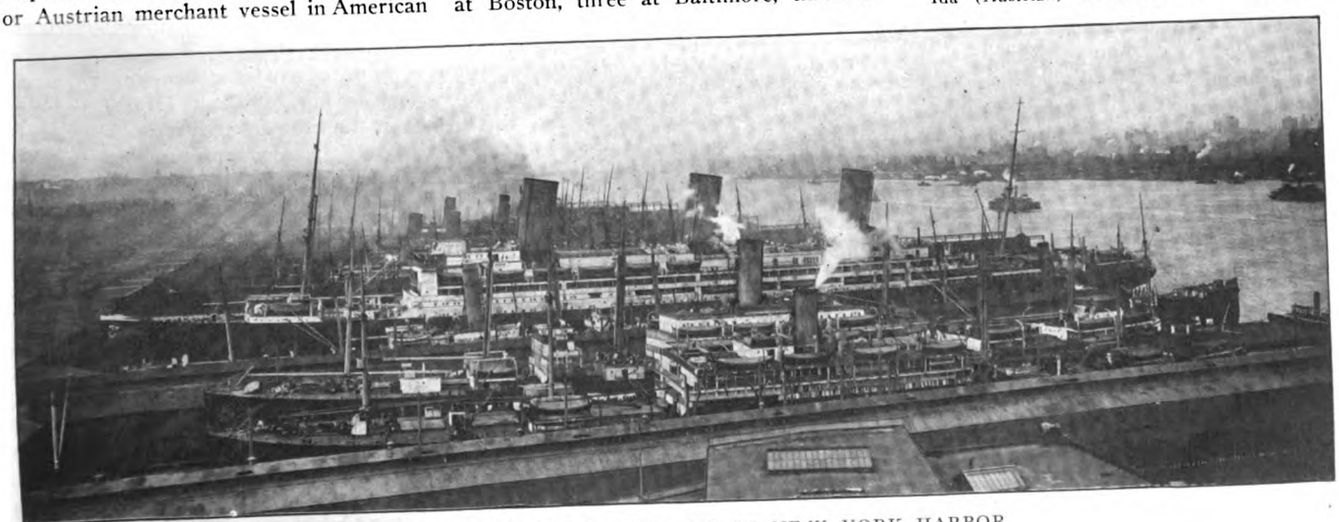
The German ships now in United States ports include some of the finest and largest passenger and freight vessels which were formerly employed in the transatlantic services of the Hamburg-American line, the North German Lloyd and one or two other German companies. In the list are such vessels as VATERLAND, of 54,282 tons gross; PRESIDENT LINCOLN, 18,168 tons gross; KAISER WILHELM II, 19,361 tons gross; GROSSER KURFURST, 13,102 tons gross; PENNSYLVANIA, 13,333 tons gross; PRESIDENT GRANT, 18,072 tons gross; BARBAROSSA, 10,915 tons gross; PRINZESS IRENE, 10,881 tons gross; AMERIKA, 22,622 tons gross; KRONPRIZESSIN CECILIE, 19,503 tons gross; CINCINNATI, 16,339 tons gross; BULGARIA, 11,440 tons gross; HAMBURG, 10,532 tons gross, and FRIEDRICH DER GROSSE, 10,695 tons gross.

Out of the total number of 65 German ships now detained at American ports, no less than 28, of an aggregate gross tonnage of 304,545 are at the port of New York, eight at Honolulu, seven at Boston, three at Baltimore, three at New Orleans, two at Philadelphia and the balance scattered among various other ports.

The accompanying list, from *The Journal of Commerce*, shows the German and Austrian vessels detained at various United States ports owing to the war, together with their respective gross tonnages:

AT NEW YORK

Name of vessel—Nationality.	Gross Tonnage.
Vaterland (German)	54,282
George Washington (German)	25,570
Kaiser Wilhelm II (German)	19,361
President Lincoln (German)	18,168
President Grant (German)	18,072
Pennsylvania (German)	13,333
Grosser Kurfurst (German)	13,102
Barbarossa (German)	10,915
Prinzess Irene (German)	10,881
Friedrich der Grosse (German)	10,695
Hamburg (German)	10,532
Koenig Wilhelm II (German)	9,410
Bohemia (German)	8,414
Adamsturm (German)	5,000
Armenia (German)	5,471
Prinz Joachim (German)	4,760
Pisa (German)	4,959
Prinz Eitel Friedrich (German)	4,650
Magdeburg (German)	4,497
Harburg (German)	4,172
Allemannia (German)	4,630
Hagen (German)	4,210
Nassovia (German)	3,902
Maia (German)	2,555
Portonia (German)	2,778
Indra (German ship)	1,746
Clara Mennig (German)	1,685
Matador (German bark)	1,468
Martha Washington (Austrian)	8,312
Dora (Austrian)	7,037
Himalaia (Austrian)	4,948
Ida (Austrian)	4,730



BIG GERMAN LINERS TIED UP IN NEW YORK HARBOR

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AT BOSTON

Amerika (German)	22,622
Willehad (German)	4,761
Wittekind (German)	5,640
Cincinnati (German)	16,339
Erny (Austrian)	6,515
Koln (German)	7,409
Ockenfels (German)	5,621
Kronprizessen Cecilie (German)	19,503

AT PHILADELPHIA

Rhaetia (German)	6,600
Prinz Oskar (German)	6,026
Franconia (Austrian)	4,637

AT BALTIMORE

Bulgaria (German)	11,440
Rhien (German)	10,058
Neckar (German)	9,835

AT NEWPORT NEWS

Arcadia (German)	5,454

AT NEW ORLEANS

Breslau (German)	7,524
Clara (Austrian)	3,932
Teresa (Austrian)	3,769
Georgia (German)	3,143
Andromeda (German)	2,935
Anna (Austrian)	1,575

AT CHARLESTON

Liebenfels (German)	4,525

AT JACKSONVILLE

Frieda Leanhardt (German)	2,789

AT SAVANNAH

Hohenfelde (German)	2,974

AT TAMPA

Porneo (Austrian)	3,624

AT GALVESTON

Campania (Austrian)	2,842
Morawitz (Austrian)	4,795

AT WILMINGTON, N. C.

Nicaria (German)	3,974
Kiel (German)	4,494

AT COLUMBIA RIVER, OREGON

Arnoldus Vinnen (German ship)	1,789
Dalbek (German bark)	2,724
Kurt (German ship)	3,109

AT HILO, H. I.

O. J. D. Ahlers (German)	4,738

AT HONOLULU, H. I.

Gouverneur Jaeschke (German)	1,738
Holsatia (German)	1,820
Longmoon (German)	1,971
Locksun (German)	1,657
Pommern (German)	2,119
Prinz Waldemar (German)	3,227
Sctos (German)	4,730
Staatessekretar Kraetke (German)	2,009

AT PUGET SOUND

Saxonia (German)	4,424
Steinbek (German ship)	2,164

AT SAN FRANCISCO

Serapis (German)	4,756
Ottawa (German bark)	2,659
Total	545,081

The list does not include the German commerce raiders which have managed to reach American ports during the months that the war has been in progress after successfully waging war on British and other shipping on the high seas for some months. Thus, the interned raider KRONPRINZ WILHELM, now at Newport News, of 14,908 tons gross, the auxiliary cruiser PRINZ EITEL FRIEDRICH, of 8,865 tons gross, which sought shelter at the port of Norfolk is now interned there, and one or two others, including APPAM, are not shown in the tabulation, although these vessels would also be subject to seizure if hostilities begin between Germany and the United States.

Big Companies Purchased

American International Corporation Acquires More Steamship Lines—United Fruit Concerned

THE aggressive plans of American capital for promoting foreign trade are rapidly unfolding themselves to the public. The initial step rests on the control of shipping facilities and the outward activity, at present, is concentrated on securing this control. The American International Corporation, recently organized by interests associated with the National City Bank of New York, is reported to have secured control of the International Mercantile Marine Co., and to have purchased a large interest in the United Fruit Co. The Pacific Mail Steamship Co. was taken over by the American International Corporation and W. R. Grace & Co., some weeks ago.

At the same time, the chartering department of the New York & Porto Rico Steamship Co. has been taken over by the newly organized International Shipping Corporation. This company is controlled by the Atlantic, Gulf & West Indies Steamship Co.

The International Mercantile Marine Co. is now in the hands of a receiver. The earnings of the company in recent months have been large. Plans for a reorganization will probably be adopted shortly and the receivership lifted. The company and all its subsidiaries in the first quarter of this year earned $13,724,765, an increase of $7,613,573 over the same quarter of 1915.

The United Fruit Co. is engaged in the production, transportation and distribution of tropical fruit from the West Indies and Central America to the United States. It operates under ownership or charter about 100 vessels. Also it owns in its tropical divisions 1,031,480 acres of lands, operates 1,142,422 acres additional under lease, as well as controling about 1,000 miles of railways. Many of its vessels were changed from British to American registry when the war broke out. Seven of its ships are now under requisition by the British government.

Control of these three steamship companies would make the American International Corporation the largest ship owner in the world. The Pacific Mail has 10 vessels, the International Mercantile Marine 125, and the United Fruit Co. 43, with more than an equal number under charter.

The directors of the Pacific Mail Steamship Co. have announced a proposed increase in the capital stock from $1,000,000 to $4,000,000. The increase is to finance the payment for the three Dutch liners, ECUADOR, COLOMBIA and VENEZUELA, recently purchased, as outlined in *The Marine Review*. These ships will probably be put in the transpacific service, from which the Pacific Mail withdrew last fall following the sale of its five largest ships to the Atlantic Transport Co.

The International Shipping Corporation, which will handle the chartering business of the Atlantic, Gulf & West Indies interests, was incorporated a few days ago in Maine for $100,000. It will carry on a general ship brokerage and commission business and plans to extend its operations all over the world. Franklin D. Mooney is president of the new company. The other officers are: Vice president, A. R. Nicol, who is also treasurer of the Atlantic, Gulf & West Indies company, treasurer, W. C. Peek, president of the Clyde and Mallory lines; secretary and manager, Joseph C. Quirk, formerly manager of the chartering department of the New York & Porto Rico company. The directors are, in addition to Mr. Mooney and Mr. Nicol, Galen L. Stone, Alfred G. Smith and H. H. Raymond. Offices have been opened at 11 Broadway, with Mr. Quirk in charge.

A New Dutch Built Motor Ship

By George Nicholson

BUILT and powered by two great Dutch firms, the motorship LARA, recently accepted by the Anglo-Saxon Petroleum Co., London, England, constitutes the eighth vessel equipped with a Werkspoor 4-cycle diesel engine to be added to the company's fleet within six years. The first was VULCANUS, a 1,000-ton tanker with a 500-horsepower Werkspoor engine. This craft is said to have effected for her owners an annual saving of about $11,000 per year over the cost of operating a steamship of equal horsepower.

LARA's principle dimensions are as follows: Length over all, 190 feet; breadth over all, 32½ feet; molded depth, 14 feet; displacement, 1,575 tons; deadweight capacity, 875 tons. The ship was built by Pott Bros., Amsterdam. Her main engine is a 6-cylinder, 4-cycle Werkspoor diesel, single acting reversible. There are two 3-cylinder sets. The cylinder diameter is 400 millimeters, the stroke being 700 millimeters. The engine develops 650 indicated horsepower at 175 revolutions per minute. The cylinders are supported on 16 turned

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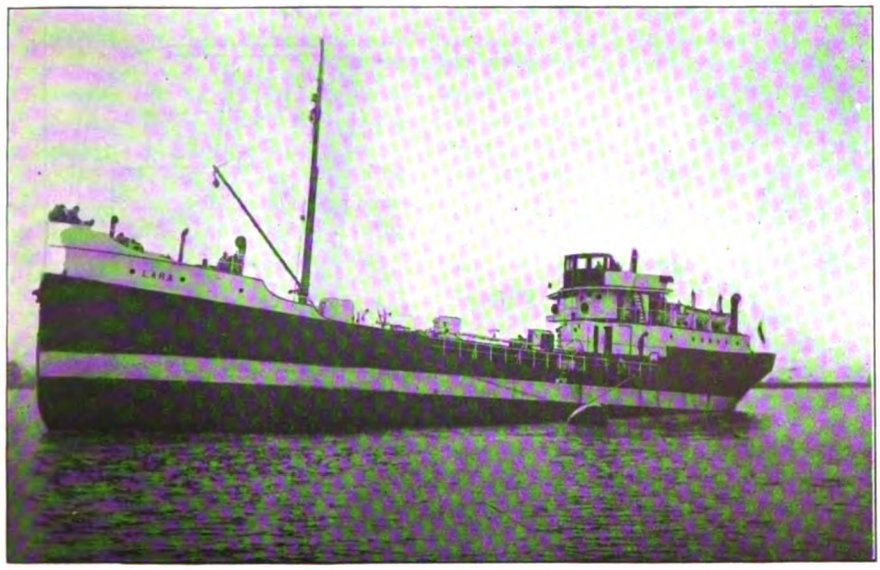


MOTOR SHIP LARA

steel, vertical columns, there being six cast iron guide columns, which are bolted to the bedplate, and are not connected to the cylinders. The upper flange fits between four straps, bolted to the cylinder flange, upon which the thrust of the guides is taken. By this method it is possible to employ light construction, also permitting of ready accessibility to the moving parts. Light, portable plates, fitted between the columns, catch the lubricating oil. The crankshaft is divided in two parts, and the cranks are set at 120 degrees.

Method of Control

At the control station are situated the telegraph lever, a reversing lever for control of the air motor, which shifts the cam shafts, and two air and fuel levers, each giving air or fuel to three cylinders. The latter levers control the eccentric sleeve, upon which the starting air and fuel valves are mounted, as well as the admission of air to the inlet valve, and the admission of fuel to the distribution boxes. A hand wheel, which is placed in the main fuel pipe line, controls the amount of fuel admitted to the distribution boxes; it is the only wheel moved when stopping the engine.

Another innovation is the arrangement of the central starting air valve directly over the control station, which is governed by means of a chain. The high pressure fuel reservoir, in the upper part of the engine room casing, contains enough fuel to keep the engine working about 20 minutes, in case of a breakdown of both the high pressure fuel pumps.

The cooling water pump is driven from a crosshead by means of pump levers. It delivers water to the cylinder jackets and to the cooler of the compressor, the guides and main bearings also being cooled by the water. The exhaust gases from the main engine are used for firing the donkey boiler when the ship is at sea; when the vessel is in port the boiler is oil-fired. The total fuel consumption of the ship is stated to be 0.3 pounds per indicated horsepower per hour, the speed being 8¼ knots per hour.

As is usual with motor tank ships, the officers' accommodations are situated around the engine room, the crew being located forward. The oil cargo tanks occupy practically the rest of the ship. The cargo pump chamber is arranged between the engine room and the tanks. The various pumps are steam driven.

The new rate of dues at the Suez Canal, representing an advance of 50 centimes per ton became effective April 1. This makes the rate 6.75 francs for loaded vessels, and 4.25 for vessels in ballast.

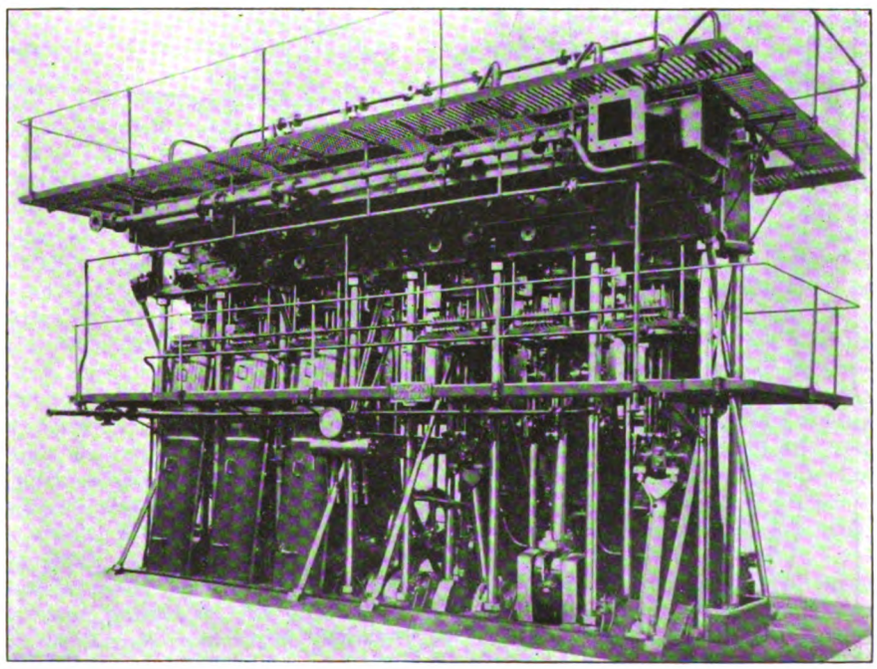
More Wire Drag Work

THE United States coast and geodetic survey, department of commerce, is about to make a resurvey by the wire-drag method of Massachusetts bay between Nahant and Cape Ann, and of the western part of Cape Cod bay between Plymouth and the Cape Cod canal. This method has been in use for 10 years on the coast of New England and has had important results in the Maine bays, Boston and Cape Cod bays, Buzzards and Narragansett bays, and East river, New York. It is in use in Alaska with marked success and has been employed in Florida, Porto Rico and Panama.

The surveys in the vicinity of Boston last year had such important results that the work is to be continued. A number of new buoys are in position, several of the old buoys have been shifted and the accepted deep chanel to the Cape Cod canal is over a mile further off shore than previously.

The wire drag consists principally of a long wire suspended at known depths below the surface by vertical wire cables, connecting buoys on the surface with suitable sinkers. It is towed by launches, the purpose being to place the wire at the proper depth to catch on all obstructions of less depth, and to pass over all of greater depth.

The maximum depth selected for the area to be dragged is 50 feet at mean low water or 58 feet at high water, wherever such depth exists. In Salem and Gloucester harbors the maximum depth will be 33 feet at mean low water. The object of the work is to insure the safety of all vessels bound to or from the Cape Cod canal, vessels bound



WERKSPOOR ENGINE FOR MOTOR SHIP LARA

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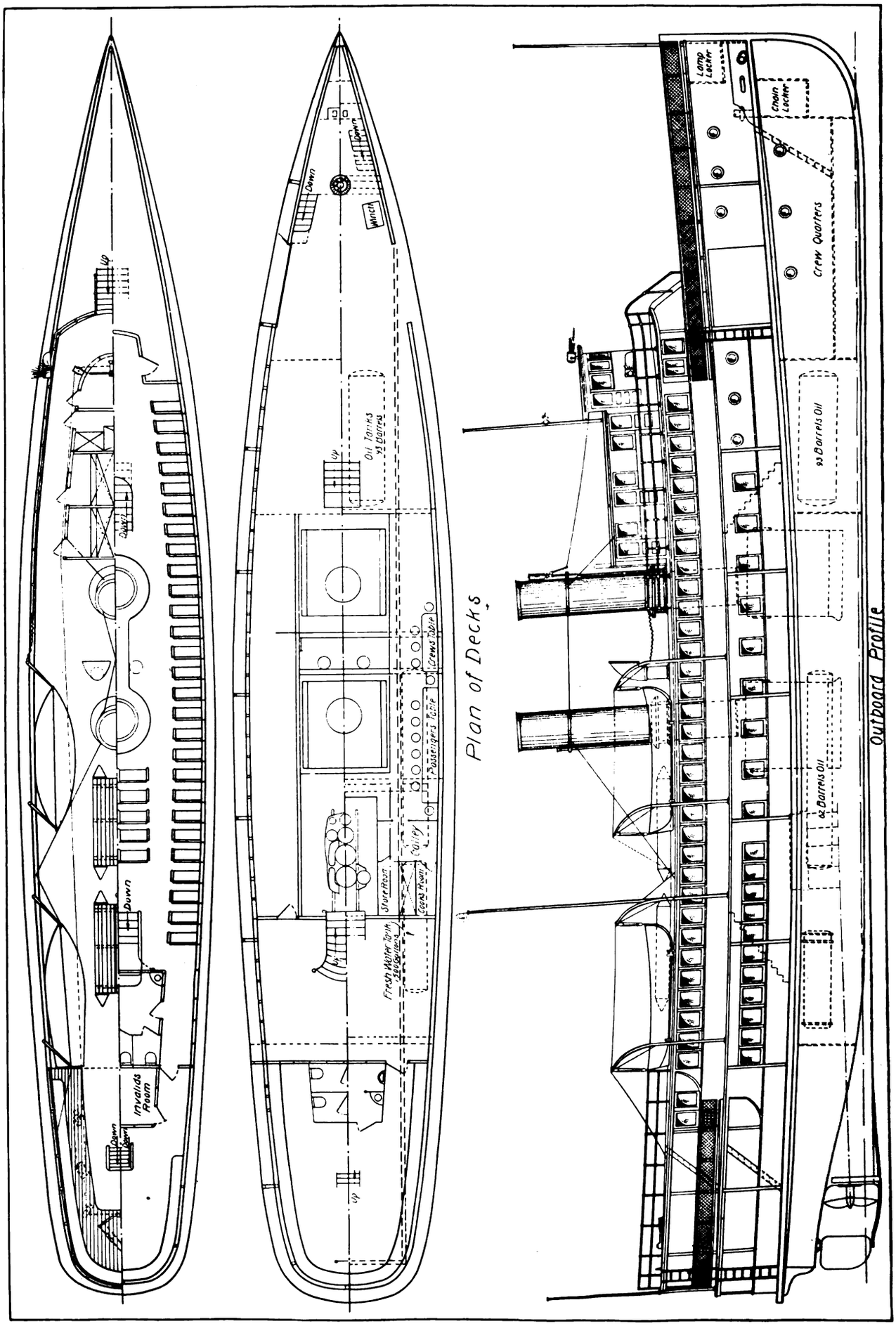

NEW PASSENGER STEAMER KITSAP II, WHICH WILL MAKE 22 MILES AN HOUR

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eastward from Boston, and those entering Salem, Beverly and Gloucester harbors.

Wire drags will be operated by coast and geodetic survey parties on the Massachusetts seacoast, Cape Ann to Nahant and Plymouth to the Cape Cod canal, in searching for dangers to navigation during the period between May 15 and Oct. 15. Vessels are advised that the long wire drags (generally three-quarters of a mile in length, but which may be five miles in length) may be crossed without danger of fouling at any point except between the towing launches and the large buoy near them where the towline approaches the surface.

Steamers passing over the drag when it is in motion are requested to alter their course so as to cross it in the direction of its progress or in the opposite direction, as a diagonal course may cause the propeller to foul the small uprights consisting of buoys and wires. They should not pass too close to the towing launches, as their slow speed and connection with the drag makes it impossible for them to move rapidly. Sailing vessels can cross the drag at any angle, but are also requested not to pass between a large buoy and the launch near it, also to avoid coming too close to the towing launches, the character of the tow making it difficult to maneuver.

Temporary Buoys

It will be necessary to place small spar buoys, consisting of bamboo poles with red and black flags as guides to fishermen in removing lobster pots and other fishing gear. These will be shifted from time to time. They in no way resemble navigation buoys and should be disregarded by navigators.

Wire-drag work interferes temporarily with the operations of fishermen, especially lobstermen. It is essential that fishing operations should be temporarily suspended in the particular localities where the wire drag work is in progress. The survey cannot reimburse fishermen whose gear is damaged by the drag.

In order to cause the least interference to the progress of the work and the operations of fishermen, the area to be dragged is divided into sections about five square miles in area. Charts showing the outlines of these sections, the order in which they will be dragged, and complete instructions and description of the method of buoying the sections are posted in post offices and other public places. Notices are attached to these charts, from time to time, to indicate the progress. It has been found that a careful observance of these instructions resulted in the least possible loss.

Two parties will be engaged in this work. One consisting of N. H. Heck, chief of party, D. M. Kyle and Max Steinberg, assistants, E. Harsch and L. P. Raynor, aids, and Geo. Olsen, watch officer, will have headquarters at Salem, Mass.; the other consisting of Jean H. Hawley, assistant, R. L. Schoppe and W. C. Sutcliffe, aids, and F. Okeson, mate, will use Plymouth as headquarters. Inquiries of the parties at work should be made at the largest or guiding launches, ESCORT, for the party working near Salem, and PILOT, for the party near the Cape Cod canal.

Fast Steamer Built for Puget Sound

THE peculiar character of the traffic on Puget Sound has been responsible for developing the distinctive designs embraced in the mosquito fleet that plies those waters. KITSAP II, whose lines are shown in the illustration on the opposite page, is the newest addition to this fleet and her design represents the latest ideas in adapting vessel construction to the demands of north Pacific service.

The volume of traffic in this fast passenger service varies widely. Some runs are only five or six miles in length while others may embrace a round trip of 200 miles. On some of the longer routes no stops are made between terminals, while on others from one to 30 stops may be made at way landings. Weather conditions vary widely, and the tides and depth of water have an important bearing in determining the design of vessel best suited for particular routes.

KITSAP II is owned by the Kitsap County Transportation Co., Seattle, Wash. This concern has operated a fleet on Puget Sound for many years and has always given careful consideration to the problem of designing its new vessels along lines that would best adapt them for the demands of their intended service.

Included in the Kitsap company's fleet are KITSAP II, HYAK, KITSAP, RELIANCE and BURTON. HYAK was described in detail in *The Marine Review*, June, 1909, and KITSAP was described in the Oct. 3, 1907, issue of *The Marine Review*. While the new vessel differs in some details from HYAK, the difference is largely in size.

KITSAP II is 150 feet in overall length, 26 feet beam, with a draft of 7 feet. She will carry both passengers and freight and will operate out of Seattle. She is designed to carry 500 passengers. Joseph Supple, Portland, Ore., built the new boat.

Her power plant consists of a triple expansion condensing engine which drives a single bronze screw 6½ feet in diameter. The propeller is driven at 500 revolutions per minute. The engine has an indicated horsepower of 2,200. The engine was furnished by the Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, New York. Steam is supplied by two water-tube boilers which have 8,000 square feet of heating surface and carry a steam pressure of 350 pounds per square inch.

Quick service is one demand of the passenger traffic that the Kitsap fleet has always endeavored to meet. KITSAP, which was built in 1906, established a speed record of 18⅛ miles per hour, which at that time made her the fastest commercial passenger steamer on the Pacific coast. HYAK, built in 1909, was equally fast. The builder of KITASP II guarantees a speed of 22 miles an hour, but an even higher record is expected.

KITSAP II is provided with oil burners. The vessels of the Puget Sound mosquito fleet were among the first to adopt oil for fuel.

Forwards First Coal Cargo

With the departure of the steamer PLEIADES from the Southern railway's new export coal terminal at Charleston, S. C., for Buenos Ayres, loaded with 5,000 tons of Clinchfield coal, the first actual step has been taken in what is hoped will be a large traffic in coal between South America and the southern coal fields through the port of Charleston. This is the first cargo of export coal to clear for South American consumption through that port.

Opportunity for the development of this commerce arises from the erection of the coal terminals which embodies the most modern ideas for facilities of this character. Coal is dumped directly into a hopper from which it is fed into the holds of ships by a belt conveyor and a telescopic chute, insuring rapid handling.

W. H. Zeliff has been appointed agent in Philadelphia for the Great Lakes Transit Co., with headquarters in the Bourse.

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What the Government is Doing

Rulings on Marine Matters **Improvements to Waterways**

Hints to Navigators

American Laws Are a Handicap

ARTIFICIAL handicaps imposed by government fiat, and from which their foreign competitors are exempt have seriously menaced American steamship operators for years. No sooner is one sweeping change precipitated, involving an expenditure of thousands of dollars per ship, than another is promulgated, or a statute enacted by congress which necessitates the replacement of equipment, just installed by other and different equipment, which, in turn, may be ordered to be thrown aside and some other substituted.

In support of these allegations, the engineering committee of the American Steamship Association has submitted a brief to the committee on merchant marine and fisheries of the house of representatives on bill H. R. 8036. This brief is designed to substantiate the reality of these burdens in the particular case with which it deals, that is the number and qualifications of engineers on American ships as compared with those on British ships.

British Requirements

"Under British law there are but two licensed engineers required for merchant steamers, viz.: first class engineer and second class engineer, without variation as to tonnage. This requirement is covered in section 92 of the British merchant shipping act of 1894, reading as follows:

"Every British foreign-going ship and every British home-trade ship, when going to sea from any place in the United Kingdom, and every foreign steamship carrying passengers between places in the United Kingdam, shall be provided with officers duly certificated under this act according to the following scale:

"If the ship is a foreign-going steamship of 100 nominal horsepower or upward, with at least two engineers, one of whom shall be a first class and the other a first class or second class engineer duly certificated.

"If the ship is a foreign-going steamship of less than 100 nominal horsepower, or a seagoing home-trade passenger steamship, with at least one engineer who is a first class or second class engineer properly certificated.

"In explanation of the words 'foreign-going ship' and 'home-trade ship,' the British statute says the following:

"'Foreign-going ship' includes every ship employed in trading or going between some place or places in the United Kingdom and some place or places situate beyond the following limits: that is to say, the coasts of the United Kingdom, the Channel islands and Isle of Man and the continent of Europe between the River Elbe and Brest, inclusive. 'Home-trade ship' includes every ship employed in trading or going within the following limits: that is to say, the United Kingdom, the Channel islands and Isle of Man and the continent of Europe between the River Elbe and Brest, inclusive. 'Home-trade passenger ship' means every home-trade ship employed in carrying passengers.

"Thus it will be seen that a foreign-going ship of small power (less than 100 nominal horse) can operate to any part of the world with only one licensed engineer, who may be an engineer of the second class. Likewise a passenger ship of any size or power of machinery may operate coastwise, and to nearby territory in France, Belgium, Holland and Germany, with only one licensed engineer, who may only have a second class certificate.

"Cargo vessels of any size or power are allowed by the above laws to operate coastwise, or to nearby foreign countries, without any licensed engineer.

"Compare the British requirements with those of this country at present in force, or as called for in the bill in question.

"Under the general rules and regulations of the board of supervising inspectors of steam vessels, which, pursuant to that act of Feb. 14, 1903, have the force of law, the following 16 grades of marine engineers' licenses are prescribed for our merchant marine:

"Chief engineer of ocean steamers.

"Chief engineer of condensing lake, bay and sound steamers.

"Chief engineer of non-condensing lake, bay and sound steamers.

"Chief engineer of condensing river steamers.

"Chief engineer of non-condensing river steamers.

"First assistant engineer of ocean steamers.

"First assistant engineer of condensing lake, bay and sound steamers.

"First assistant engineer of non-condensing lake, bay and sound steamers.

"First assistant engineer of condensing river steamers.

"Second assitant engineer of ocean steamers.

"Second assistant engineer of condensing lake, bay and sound steamers.

"Second assistant engineer of non-condensing lake, bay and sound steamers.

"Second assistant engineer of condensing river steamers.

"Third assistant engineer of ocean steamers.

"Third assistant engineer of condensing lake, bay and sound steamers.

Harmful Limitations

"In addition to the above 16 grades specified in the rules, the United States local inspectors of steam vessels make a practice of stating on an engineer's license the maximum gross tonnage of the vessel on which he may serve. This limitation is irrespective of power of ship, or engineering skill necessary to successfully perform the duties required. The gross tonnage of a vessel is no criterion of the quantity or quality of engineering labor or skill necessary to operate it safely and successfully, and it is a surprise to us that an engineers' association, composed of practical men, should have used the tonnage standard in their endeavor to make laws to govern the number of men to be employed on machinery-propelled vessels.

"A table prepared shows 16 groups of vessels, in each group of which the vessel with the greatest tonnage has less horsepower, and requires less engineering labor, skill and knowledge than the vessel with the smallest tonnage. The vessels in this table are not exceptional cases; the list could be extended almost indefinitely.

"The practical effect of the American requirements, and the way same are enforced by the United States steamboat inspectors, is to artificially

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create a restriction on the number of men available, which no legislation should seek to promote. Great Britain's unchallenged success as a maritime nation is largely due to the fact that her legislature has not sought to hamper the operation of her ships by such handicaps as have been imposed on American steamers. Is it any wonder, then, that our overseas tonnage is so small in comparison with that of our trade rivals?"

New Direction Finder

The attention of all ships navigating the waters of Cape Cod has been directed by the commandant of the Boston navy yard, to the installation, at the United States naval radio station, North Truro, Mass., of the Bellini Tosi direction finder. The purpose of this device is to ascertain the true bearing by radio waves of the ship from the radio station, North Truro, as well as the true direction of the station from the ship, thus affording a new aid to navigation in determining their position by radio. It must be understood that this apparatus is still in an experimental stage and too much confidence should not be placed in the bearings given. From tests already conducted, the direction finder has been found to be correct within about two degrees. All merchant vessels, fitted with radio, are requested to co-operate with the department in these experiments, and whenever within radio range of North Truro should request their bearings from that station and inform North Truro how such bearing checks with the ship's observation. In accordance with the above the following procedure should be followed by ships desiring to get their bearing from the radio station, North Truro:

A ship will call by radio the radio station, North Truro, whose call letters are *N A E*, and request her bearing. North Truro will acknowledge and request the ship to send long dashes for five minutes on 600-meter wave length, and will record the ship's direction on the direction finder, reporting it to the ship. North Truro being on the point of Cape Cod, a ship may be on the other side of the cape for the same setting of the direction finder. The ship will therefore be given the two possible angles from true north, the decision being left to the ship as to which is her correct bearing. The position of the radio station, North Truro, is latitude 42 degrees 2 minutes 28 seconds north, longitude 70 degrees 3 minutes 38 seconds west. The report sent to the ship will read, for example, as follows:

Position true—north 120 degrees west, and north 60 degrees east, from latitude 42 degrees 2 minutes 28 seconds north, and longitude 70 degrees 3 minutes 38 seconds west,—these being the possible true bearings of the ship from the radio station.

Redfield Urges Change

Secretary of Commerce Redfield has addressed to Senator James P. Clarke, chairman of the committee on commerce, a communication urging the amendment of the seamen's act of Mar. 4, 1915, with respect to the minimum number of life buoys on small vessels. The letter states:

"There are now pending before your committee senate bill 4458 and house bill 13112, both of the same tenor. The latter passed the house last week. They amend section 14 of the seamen's act of March 4, 1915, by correcting an apparent oversight respecting the minimum number of life buoys with which steamers shall be equipped. The correction will make the unintentional severity of the present law much less onerous. I respectfully invite your attention to the matter, making the special request on behalf of our vessel interests that the matter may have your early and affirmative attention.

"It was not the purpose to require that small vessels should have as many as 12 life buoys. Such a requirement is at once absurd and impossible. There is no place on small vessels to put so many, and so far from providing a means of safety they create a nuisance. Indeed, in some cases the literal compliance with the existing law would require more life buoys than there are men in the crew.

"Earnest request has been made, and with justice, against this clause. It requires often a useless outlay and involves a pure waste of money. The department earnestly hopes that favorable action upon the bill revising this requirement may be taken before vessel owners shall have been obliged to go to considerable needless expense at the opening of the coming season."

Law Causes Some Delay

ENERGETIC measures adopted by the vessel owners of the Great Lakes, largely through the Lake Carriers' Association, have enabled the bulk of the lake fleet to go into commission without suffering serious delay because of the "certificated" seamen requirements of the LaFollette law. The scale of wages on the lakes has always been higher than on salt water, and advances made during recent months on the ocean were offset by similar increases on the Lakes. As a consequence, many men were attracted to the lakes, the Lake Carriers promoting this movement by a widespread publicity campaign. A number of boats have been delayed owing to the scarcity of "certificated" seamen, and this difficulty will prevail throughout the season as it is impossible to keep the men distributed at the different ports in the proper proportion to meet the demand.

Steamboat Inspection Service Rulings

The following is a summary of rulings made since Feb. 29, 1916, relating to the transportation of certain articles on steam vessels carrying passengers:

Macomber wave oil may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. Inquiry presented by H. S. Macomber & Co., Boston, Mass.

Wilson signal oil may be transported on steamers carrying passengers under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. Inquiry presented by O. C. & K. R. Wilson, of New York, N. Y.

Disinfectant hypozone may be transported on steamers carrying passengers, and may be used as stores on pleasure or passenger steamers. Inquiry presented by Garrett H. Smith, of New York, N. Y.

Marine illuminating oil may be used as stores on passenger or pleasure steamers, and may be transported on such steamers. Inquiry presented by Liberty Oil Co., of New Orleans, La.

Fiske's marine auxiliary illuminating oil may be transported on steamers carrying passengers, and may be used as stores on passenger or pleasure steamers. Inquiry presented by Fiske Bros. Refining Co., of New York, N. Y.

Heaney's marine metal polish may be used as stores on passenger or pleasure steamers, and may be transported on passenger steamers. Inquiry presented by the Heaney Mfg. Co., of Boston, Mass.

Kwyk metal polish may be used as stores on pleasure or passenger steamers, and may be transported on steamers carrying passengers. Inquiry presented by the West Disinfecting Co., of Washington, D. C.

Atlas illuminating oil may be transported on steamers carrying passengers, and may be used as stores on such steamers. Inquiry presented by the Swan & Finch Co., of New York, N. Y.

A misunderstanding existing that only certain kinds of illuminating oil may be used as stores on freight or towing steamers, you are informed that the rulings that have been made with reference to illuminating oils, the transportation of dangerous articles, etc., have reference only to passenger and pleas-

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ure steamers, and not to freight and towing steamers. There are no rulings with reference to the kind of oil, etc., that should be used as stores or transported on other than passenger or pleasure steamers.

Providence Channel Completed

The work of dredging the 30-foot approach channel to Providence harbor was completed on May 3, 1916. This channel is 30 feet deep at mean low water and 600 feet wide. It extends from the nearest point of Narragansett bay where a natural depth of 30 feet is found, opposite North point, Popasquash neck, near Bristol, to the entrance to Providence harbor proper at Fields point, a distance of nearly 9 miles. Deepening Providence harbor above Fields point to a depth of 30 feet over an area of about 1½ miles long and having an average width of about 1,500 feet is now going on and good progress has been made. This will probably be completed during the present calendar year.

April Lake Levels

The United States lake survey reports the stages of the Great Lakes for the month of April, 1916, as follows:

Lakes.	Feet above mean sea level.
Superior	602.38
Michigan-Huron	579.92
Erie	572.42
Ontario	246.40

Lake Superior is 0.21 foot higher than last month, 1.06 foot higher than a year ago, 0.84 foot above the average stage of April of the last ten years, 0.31 foot below the high stage of April, 1860, and 1.84 feet above the low stage of April, 1911. During the last ten years the April level has averaged about the same as the March level and 0.3 foot lower than the May level.

Lakes Michigan-Huron are 0.44 foot higher than last month, 0.42 foot higher than a year ago, 0.34 foot below the average stage of April of the last ten years, 3.31 feet below the high stage of April, 1886, and 0.70 foot above the low stage of April, 1896. During the last ten years the April level has averaged 0.2 foot higher than the March level and 0.3 foot lower than the May level.

Lake Erie is 0.58 foot higher than last month, 0.97 foot higher than a year ago, 0.04 foot above the average stage of April of the last ten years, 1.76 feet below the high stage of April, 1862, and 1.16 feet above the low stage of April, 1895. During the last ten years the April level has averaged 0.6 foot higher than the March level and 0.3 foot lower than the May level.

Lake Ontario is 0.94 foot higher than last month, 1.36 feet higher than a year ago, 0.03 foot above the average stage of April of the last ten years, 2.03 feet below the high stage of April, 1886, and 1.56 feet above the low stage of April, 1872. During the last ten years the April level has averaged 0.5 foot higher than the March level and 0.4 foot lower than the May level.

Alaska Survey Fleet

The wire-drag and survey work of the coast and geodetic survey, department of commerce, for the season of 1916 in Alaskan waters, will begin at an early date, as the men and vessels to be employed on that work have already sailed from Seattle for Ketchiken.

The wire-drag parties, in charge of John A. Daniels and L. O. Colbert, left Seattle on March 31. The boat EQUATOR, chartered for the use of Mr. Daniels' party, sailed on April 3, and the power schooner KING AND WING, chartered for the use of Mr. Colbert's party, sailed on April 5. The survey steamer EXPLORER, commanded by F. H. Hardy, left Seattle on April 4, and she was followed the next day by the survey steamer PATTERSON, commanded by C. G. Quillian. The wire-drag parties will work in Clarence and Sumner straits, PATTERSON in the waters tributary to Clarence strait, and EXPLORER on the west coast of Prince of Wales island.

Panama Canal is Reopened

AFTER being closed for seven months, the Panama canal was reopened April 15. The original slide occurred on Sept. 20. Fifteen ships went through the canal during the first three days, as follows: Saturday, April 15, northbound: ST. VERONICA, CETRIANA, EDITH, CROWN OF SEVILLE, HARRY LUCKENBACH, SOMMERSTAD and ALFRED NOBEL; southbound: CYRUS W. FIELD, OYLERIC, LEWIS LUCKENBACH, BUFORD, JACOB LUCKENBACH, WINDBER, GILGAI and EUREKA.

Sunday, April 16, northbound: FLORENCE LUCKENBACH, COPENHAGEN, KIM, AMERICAN and THODE FAGELUND; southbound: TENRYRUS MARU, HARIMA MARU, CHIMU, LUZ BLANCA and FALSTRIA.

Monday, March 17, northbound: CAPAC, SELANDRIA, GWLADYS, CONSOLS, SOLANO and SAN JUAN; southbound, ARABIAN and FORERIC.

This was the maiden trip of SAN JUAN through the canal and the first Pacific Mail ship to use the canal. The deepest draft ship making the transit during these three days was ARABIAN, drawing 28.3 feet.

The use of the canal will probably not be resumed on a normal basis for some months to come. The confidence which was once felt in the canal was destroyed by the slide last fall and with the services of vessels at their present high value, steamship companies hesitate to place themselves in a position where a repetition of the delays with attendant money losses, even if traffic were only temporarily suspended, would be possible. The consequence is that those companies which depended for the maintenance of their service on the Panama canal will not resume immediately, but will wait until the canal has been tested.

Lines which will send their ships through the canal at once are those maintaining services where the use of the canal means merely a shortening of the voyage. In this class are companies operating vessels from Atlantic ports of the United States to the west coast of South America. The temporary suspension of traffic would work great hardship on these lines, because of the delay in taking the longer course and the necessity of provisioning ships differently unless the canal is used, but the saving in expense is such as to warrant running the risk. The Grace Steamship Co., the New York & South American Line and others are now sending their ships by way of the canal.

Other companies which have announced their intention of resuming service via the Panama canal are: the Johnson Line between Christiana, Norway, and San Francisco; the East Asiatic Line, between Copenhagen and San Francisco, and the Harrison Direct Line, between San Francisco and Liverpool.

The four lines engaged in the coast to coast service, the Luckenbach Steamship Co., American-Hawaiian, Grace Steamship Co., and Panama-Pacific, will not resume operation at present. KROONLAND and FINLAND, of the Panama-Pacific Co., are now operating in the service of the American Line on the Atlantic and will not be replaced on the coast to coast route for three or four months. The company has announced its intention to put the two steamships back in the trade, however, as soon as it is assured that service through the canal will not again be interrupted. The other companies have not made any plans as to when they will reenter the trade.

The American-Hawaiian and Luckenbach lines have placed a majority of the ships formerly used in the coast to coast business out on charter and will be unable to get their fleets together again for six months or a year at least.

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They are operating some of their ships in other trades, where the rates are higher, so that it would prove unprofitable for them to return these to the service. The delays experienced in obtaining shipments at New York for the Pacific ports, due to the congestion of freight there, constituted a heavy item of expense before the canal was closed, and until conditions change for the better the loss from this cause alone will militate against the resumption of the service.

Describes Steel Equipment

The line of steel equipment for ships manufactured by the Bernstein Mfg. Co., Philadelphia, is illustrated and described in an attractive catalog now being distributed. This line includes ship berths, ship beds, dressers and supply cabinets, wardrobes, tables, chairs, lockers, ladders, etc. A great many different styles of berths and beds are illustrated.

New Line to Africa

Gunnar Carlsson, general manager of the Transatlantic Steamship Co., Gothenburg, Sweden, states that arrangements have been completed whereby his line, with 17 steamships in service and six motor vessels now building, was about to establish direct service between New York and ports of India and Africa.

The new service began early in May with the sailing of the Swedish steamship TASMANIC, and 20 further sailings have been scheduled. Later in the year the steamships will call at Philadelphia and gulf ports, he said.

"Since my arrival in New York from Sweden," Mr. Carlsson continued, "I have been assured of sufficient business to justify me in recommending to my directors the placing of the entire fleet in the American trade. The 17 ships we now own have for 10 years been engaged in trade between Sweden and African-Indian ports. In Gothenburg ship yards, there are building six motor-driven ships, three of which will be of 9,000 tons each, to have a speed of 13 knots—the largest and fastest motor ships in the world. Usual exports from Sweden to the United States will be supplemented by cargoes of jute, burlap, manganese ore, etc., from India and Africa."

The Babcock & Wilcox Co., New York, has reprinted the comprehensive paper on oil fuel presented by Ernest H. Peabody at the International Engineering Congress in San Francisco in September, 1915. Mr Peabody is engineer of the Babcock & Wilcox Co.

Soo Canal Report

The report of the superintendent of St. Mary's Falls canal shows that 2,215,362 net tons of freight passed through the canal during April, 1916, as against 1,434,735 tons in April, 1915, an increase of 780,627 tons. These figures are in excess of any corresponding movement during the past five years, the exact figures being as follows:

April, 1915	1,434,735	net tons
April, 1914	774,520	net tons
April, 1913	1,905,555	net tons
April, 1912	166,918	net tons
April, 1911	792,587	net tons

The American canal carried 1,825,210 tons against 390,152 for the Canadian canal, although the Canadian canal opened April 18 and the American canal on April 20. Following is the summary:

Articles.	U. S. canal.	Canadian canal.	Total.
EAST BOUND.			
Copper, short tons	.....	.....	.....
Grain, bushels	2,144,744	1,430,880	3,575,624
Building stone, short tons	.....	.....	.....
Flour, barrels	.....	25,260	25,260
Iron ore, short tons	693,591	181,716	875,307
Pig iron, short tons	.....	.....	.....
Lumber, M. ft. B. M	.....	754	754
Wheat, bushels	16,207,085	4,654,832	20,861,917
General merchandise, short tons	19	.....	19
Passengers, number	.....	15	15
WEST BOUND			
Coal, hard, short tons	100,800	.....	100,800
Coal, soft, short tons	477,798	27,800	505,598
Flour, barrels	.....	.....	.....
Grain, bushels	.....	.....	.....
Manufactured iron, short tons	5,822	227	6,049
Iron ore, short tons	.....	.....	.....
Salt, barrels	31,999	14,000	45,999
General merchandise, short tons	19,762	9,438	29,200
Passengers, number	.....	34	34
SUMMARY			
Vessel passages, number	530	168	698
Registered tonnage, net	1,721,949	378,445	2,100,394
Freight:—			
East bound, short tons	1,216,228	350,687	1,566,915
West bound, short tons	608,982	39,465	648,447
Total freight, short tons	1,825,210	390,152	2,215,362

New Regulations for Oil Burning Vessels

Amendments to the rules and regulations relating to the installation of fuel oil tanks on steamers and to applications for permission to use petroleum as fuel on ships have been adopted by the board of supervising inspectors of the United States steamboat inspection service. Greater discretion has been given to the respective inspectors of the districts in deciding how the tanks shall be installed on ocean steamers, and it is ordered that an application for permission to use petroleum as fuel must be made in duplicate to the supervising inspector of the district in which the vessel is at the time she is equipped for that purpose.

In revising the rules that govern oil burning ships the board struck out an entire section, including more than a page of specific instructions on the building of tanks to be used on ocean and coastwise vessels. A new provision extended to ocean shipping the more general provision that has heretofore applied to shipping on lakes, bays, sounds and rivers. It added for each of these classes of ships the provision that application must be made in the way specially prescribed for permission to use oil fuel. The new provision for ocean or inland steamers reads:

"The fuel oil tanks on all (ocean or inland) steamers, subject to the rules and regulations of the steamboat inspection service, shall be constructed of material of such thickness and workmanship as, in the judgment of the inspector in whose district the installation is made, is safe.

"Application for permission to use petroleum as fuel must be made in duplicate to the supervising inspector of the district in which the vessel is at the time she is equipped to use oil as fuel. Application to use petroleum as fuel must be made on the blanks furnished for that purpose. Two blue prints or tracings showing the proposed installation of the tanks, pumps, piping, valves and burners must accompany the application.

Issue Harbor Report

The harbor commissioners of the port of Los Angeles have issued a pretentious 136-page report covering the activities of the port for the year ended June 30, 1915. The book also includes port statistics and the laws, ordinances and rules governing Los Angeles harbor and celebrates the completion of the Panama canal, a project whose importance to the "Port of the Angels" can scarcely be overestimated. During the past year, the port commissioners expended the last of an original bond issue of $3,000,000, the work now under way be-

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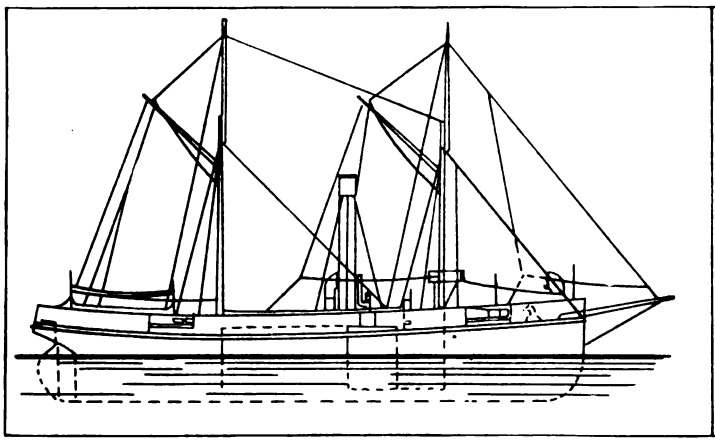
ing paid for from a second bond issue of $2,500,000. The period described has witnessed the completion of many large improvements, which include concrete wharves and freight sheds, ferry slips, extensive dredging operations, the construction of a water tower for fire service and the completion of a belt line railroad. Several new projects have been undertaken including a fisherman's harbor and a six-story concrete warehouse, as well as further dredging operations. Steps have also been taken toward reducing port charges. The commissioner's report embodies those of the harbor engineer, the secretary and acting traffic manager, the city attorney on harbor matters and others. Many illustrations of characteristic maritime activities are shown. The publication includes a list of ocean vessel arrivals at the port during the past year, as well as a handsome map of the harbor and environs.

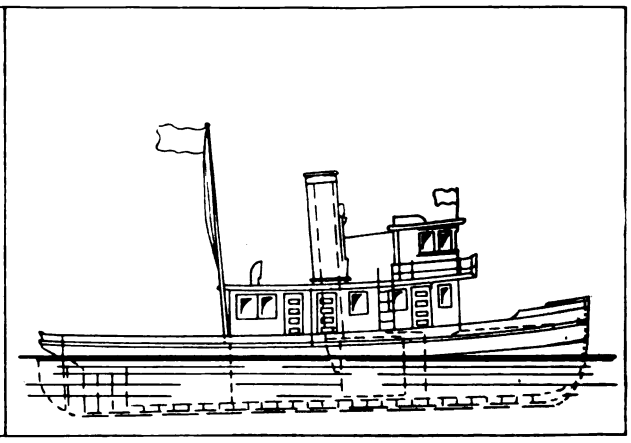
Rebuild Historic Tow Boat

THE towboat DE LESSEPS, formerly operated by the French companies as a part of the equipment with which they attempted the great project in the early eighties, was recently placed in commission by the Panama canal authorities after a thorough overhauling and reconstruction, which resulted in converting her from a tender and supply boat into a modern towboat. DE LESSEPS will henceforth be used as an "inside towboat" for handling dump barges, fuel lighters and dredges in Gaillard cut, where a boat of small dimensions can be worked to great advantage, owing to the restricted area of operations. The work of overhauling and reconstruction was completed in only 23 working days. DE LESSEPS was brought alongside the dock at the Paraiso shops, where she was erected and finished in the shops complete and then placed on board the boat. The change in boilers resulted in raising the steam pressure from 75 to 120 pounds, thereby allowing the engines to swing a larger propeller, and increasing the power of the boat as well as her towing efficiency. The installation of the up-to-date oil-burning system increased the amount of steam generated, thereby increasing the general efficiency of the power plant. All the machinery necessary for the auxiliaries was transferred from equipment on which it was no longer required.

DE LESSEPS is of the following dimensions: Length over all, 72 feet; molded beam, 15 feet; molded depth, 9 feet. The boat is equipped with a compound condensing engine, having a 12-inch high pressure cylinder and a low pressure cylinder 22 inches in diameter, with an 18-inch stroke. The vessel is one of the largest pieces of floating equipment of her class used by the French companies. She was built for the first French company by Lobnitz & Co., Renfrew, Scotland, in 1883, and made the voyage across the Atlantic under sail, using the engine as an auxiliary, being unable to carry sufficient coal on board for the entire voyage. The accompanying illustrations show the boat as she left the builder's yard to start on her voyage, and as she has now been reconstructed. Following the failure of the second French company the boat was laid up in the French canal above the dry dock at Cristobal, being reclaimed, overhauled and placed in service by the Atlantic division in 1909. She was transferred to the cut in 1914. Of the original boat, the hull and the engine are about all that remain.



DE LESSEPS AS SHE CAME FROM RENFREW, SCOTLAND, IN 1883



DE LESSEPS AS SHE WAS RECENTLY PLACED IN COMMISSION

Scandinavian Lines Busy

Remarkable earnings appear to be the rule for Scandinavian shipping. Stockholm's Rederibolag Svea has, during 1915, earned 7,000,000 kroner, while Rederibolaget Iolani, Helsingborg, paid a 100 per cent dividend for the same year. The Danish East Asiatic Co., Copenhagen, declared a 30 per cent dividend for the year, while a large amount is being added to the reserve fund. The net profit of this company was 28,376,153 kroner. The Steamship Co. Faerm is another organization which will pay a high dividend—100 per cent. The Steamship Co. Fiona is paying a 40 per cent dividend and the Steamship Co. Vendila 50 per cent for 1915. The Danebrog, with 19 steamers, pays 50 per cent; the Dampskibsselskabet of 1896 pays 40 per cent; the Neptun also 40 per cent. Norwegian profits have been proportionately large.

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American Ship Yard Activities

A Snappy Summary of the Leading Events of the Month in the Vessel Construction Field

Launch Two Boats on Same Day

THE second of the 12,000-ton bulk freighters which the American Ship Building Co. has under contract for delivery this year, was successfully launched Saturday, May 6, at Lorain. At the same time at the Cleveland yard, the company launched a smaller freighter under construction for Norwegian owners. The double launching on the same day furnishes concrete evidence of the revival of lake ship building, as the American company built but one freighter during 1915.

The new ore carrier was christened D. G. KERR, after the first vice president of the United States Steel Corporation. She is being built for the Pittsburgh Steamship Co., the lake branch of the Steel Corporation.

D. G. KERR, like most of the new 1916 bulk freighters, is 600 feet overall, 580 feet keel, 60 feet beam and 32 feet deep. She will be equipped with triple expansion engines, with 24½, 42 and 65-inch cylinders and 42-inch stroke, and will have three Scotch boilers. She is of Isherwood construction, and is built under Lloyds inspection to class A1. She will have 9-foot hatches, spaced on 12-foot centers. The indicated horsepower is 2,300.

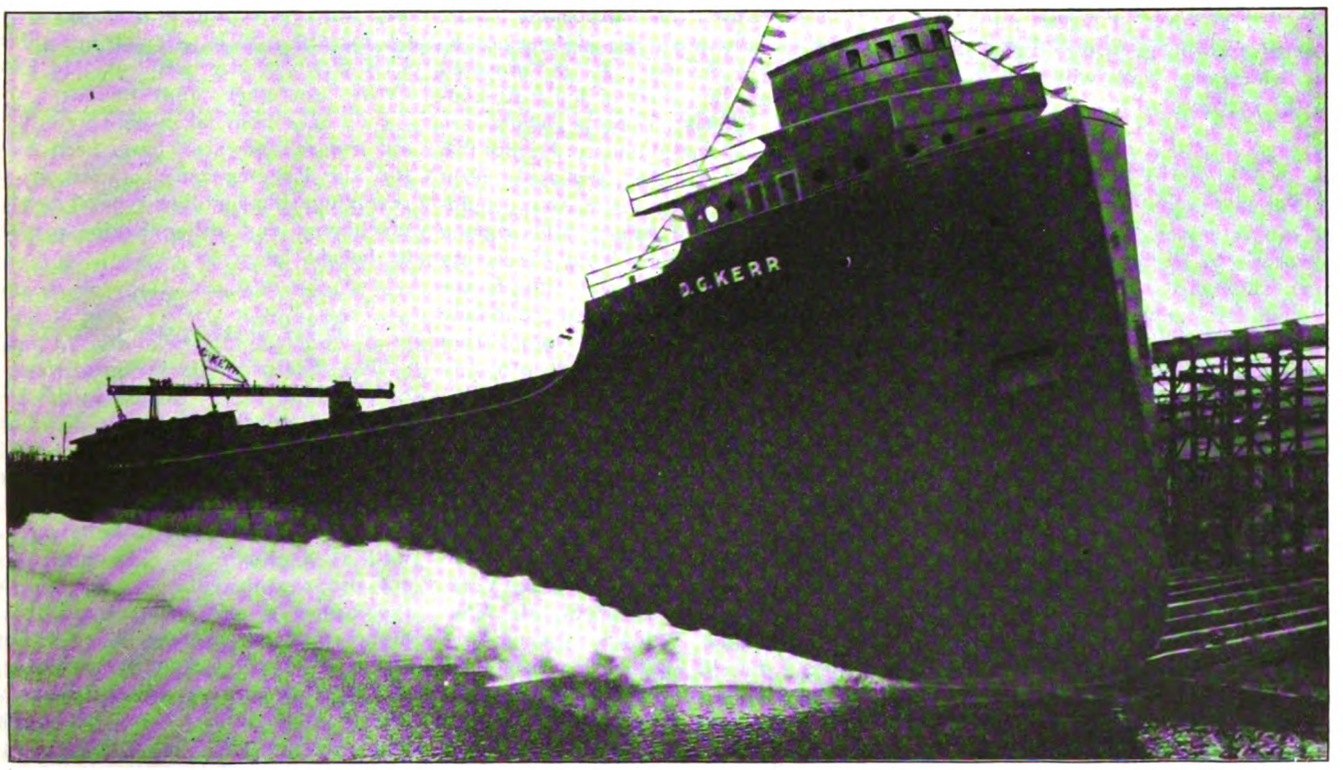
When D. G. KERR goes into commission in June or July, the Pittsburgh Steamship Co. will have 22 steamers of 600 feet or over in its service. Another vessel of the same dimensions will be launched at Lorain within a few weeks, and a third will be dropped into the water at the plant of the Great Lakes Engineering Works about the same time.

Mrs. Margaret M. Kerr, Pittsburgh, 77 years old, christened the big vessel in honor of her son. The launching party included Mrs. Kerr, D. G. Kerr, Miss Kerr, Mr. and Mrs. Thomas Morrison, Mr. and Mrs. D. M. Clemson, Mr. and Mrs. McGilvray Shiras, Mr. and Mrs. E. H. Utley, L. C. Bihler, J. J. Campbell, Mr. and Mrs. W. C. McClauslan, all of Pittsburgh; Mr. and Mrs. W. A. McGonagle, Duluth; Mr. and Mrs. Henry G. Dalton, Mr. and Mrs. Harry Coulby, Mr. and Mrs. A. S. Chisholm, Mr. and Mrs. E. C. Collins, A. F. Harvey, J. R. Mills, Cleveland; J. M. Sias, New York, and Captain and Mrs. A. P. Chambers, Port Huron, Mich.

Captain A. P. Chambers will bring the new boat out, with E. H. Learned as chief engineer. Captain Chambers was master of the steamer W. P. PALMER last season.

The steamer HENRY G. DALTON was launched at Lorain a few weeks ago. She is of the same dimensions as D. G. KERR, and will go into commission shortly. She is being built for the Interlake Steamship Co.

The boat launched at Cleveland has not been named, merely carrying the yard number 459. She is of full Welland canal size, and is of the same dimensions as the boat launched a few weeks earlier at the Detroit yards of the American Ship Building Co. She is 260 feet overall, 250 feet keel, 43½ feet beam and 20 feet deep. Her gross ton-



BULK FREIGHTER D. G. KERR TAKING HER FIRST DIP

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nage is 2,100, carrying capacity about 3,000 tons, speed 9½ knots and indicated horsepower 1,600. She will go into commission in June, leaving immediately for salt water. The American Ship Building Co. is building a number of boats for foreign interests.

Mrs. J. L. Wallace was sponsor for the new boat, the launching being witnessed by a large number of people.

New Type Schooner Built

At a cost of $180,000, Fields S. Pendleton is having constructed at Noank, R. I., a five-masted schooner which is said to be a novelty in seagoing craft. She is to be supplied with steel keelsons and steel strapped planking 5 and 6 inches in thickness. She is to be without topmasts but will have oil burning engines to furnish power for twin screws. It is expected that she will be ready for launching in June. She will bear the name of her owner, who is a prominent man in marine matters and resides in New York.

Launch First Oil Tanker

The steamship GEORGE E. PADDLEFORD was launched at noon April 18 from the yards of the Harlan & Hollingsworth Corporation. She is the first oil tanker built by the corporation for the Petroleum Transportation Co., a subsidiary of the Mexican Petroleum Co. Mrs. J. F. Wood, of New York, was sponsor. The new boat is 405 feet long, 51 feet 4 inches beam and 30 feet deep. The vessel has a capacity of 7,500 tons on a draft of 24 feet. It will be lighted by electricity and will be equipped with wireless.

To Build 360 Ships

Three hundred and sixty steel merchant vessels were building or under contract to be built in private American ship yards on April 1, according to builders' returns to the bureau of navigation of the department of commerce. The gross tonnage of these vessels is 1,067,856, representing an increase from 945,798 gross tons and 244 vessels reported on March 1. Comparative tables beginning with July 1, 1915, are given showing that on that date there were 76 vessels building or under contract with a gross tonnage of 310,089. On Dec. 1 these figures had increased to 202 vessels, with a total gross tonnage of 761,511.

Separate statistics are given for the seaboard and for the Great Lakes and western rivers. On July 1, 1915, the total of 76 vessels was divided between 62 on the seaboard and 14 on the Great Lakes and western rivers. On Dec. 1, last, 163 vessels were reported from the seaboard builders and 59 from the others. At the first of April the figures were 176 for the seaboard and 184 for the other classification. On this last date the gross tonnage represented was 823,651 and 244,205, respectively.

Details are also given regarding the vessels under construction in the various yards on new contracts. There are 23 steamships and an oil barge listed, and in only three cases is the construction for foreign account. Two are colliers, and the rest are either tankers or cargo ships. With the exception of the colliers, which will probably not be launched until the spring of 1918, most of the contracts call for launching or delivery either this year or next. The largest ship listed is one of 8,100 gross tonnage, with a speed of 18 knots, the rest ranging from 2,100 to 7,200 gross tonnage, with speeds of from 9½ to 12 knots.

Sun Co. to Build Plant

ANOTHER important addition to the rapidly-expanding ship building industry along the Delaware river, the Clyde of the United States, which will represent the largest new yard added to the ocean-going capacity of the country in a number of years, is to be established at Chester, Pa., by the Sun Co., a leading independent organization.

Contracts have been placed for the erection of a complete new ship building plant costing, it is estimated, about $5,000,000. The plans call for a yard of six ways, each 100 feet wide by 600 feet long, or with a capacity for building ocean craft up to 15,000 tons in size. The company proposes to standardize ship building operations in that it will specialize on a few approved designs of both tank ships and cargo vessels, both for its own use and for the merchant trade, thereby effecting the highest economies of operation. It is proposed as soon as the yard is built to construct 18 10,000-ton boats which are to be completed in about 30 months. The layout of the proposed plant provides for three large shop buildings, the first of which will contain the machine shops and receiving bays, where the material enters; the second, the plate and angle shop and the third, the erecting shop from which the work is moved into any of the six ways.

State Senator W. C. Sproul, Chester; J. Howard Pew and Joseph N. Pew, of the Sun Oil Co., and Marcus Hook were leading factors in the formation of the new company. Among others interested are; General T. Coleman du Pont, New York, and Wilmington, Del.; S. M. Vauclain, of the Baldwin Locomotive Works; E. V. Babcock, Pittsburgh lumber man, and J. Leonard Replogle, formerly of the Cambria Steel Co.

Contracts for two tankers for the Sun Oil Co. and for four more for other interests are now in hand. It is expected that the first keel will be laid in about a month. More than $3,000,000 of the $5,000,000 capital of the company will be expended in constructing and equipping the new yard. The company's principal offices will be in the Finance building, Philadelphia, Pa.

The Sun Co. has acquired the going plant of the Robert Wetherill & Co., Chester, Pa., manufacturer of boilers and engines, and will build its own engines. This step insures the company a great saving of time in providing for the outfitting of its new ships. A new company now is being formed to handle the ship building proposition to be known as the Sun Shipbuilding Co. The Sun Co. is a New Jersey corporation with a capitalization of $9,600,000. It is both a producer and a refiner of oil and has a large refinery at Marcus Hook, Pa., near which the new shipyard will be located. J. H. Pew is president; J. N. Pew Jr., vice president, and Frank Cross, secretary and treasurer.

Bids have been taken on 15 to 20 15-ton cranes and also have been asked for six large-capacity cranes of the revolving ship building type. The shop machinery and other equipment will be bought later.

Will Enlarge Plant

The Seaford Marine Railway & Shipbuilding Co., of Seaford, Del., has been purchased by A. D. Cummins and others, of New York. The property includes 20 acres of land and one-half of a mile of water front along the Nanticoke river, as well as a saw mill. The new owners propose to enlarge and improve the property and bring it up to a high standard of excellence. Contracts for several wooden barges and sailing vessels have already been received and sufficient orders are in hand to provide work for the ship building plant for a period of two years.

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Motor Driven Ferry for Seattle

Details on an Interesting Craft Designed for Bay Service —A Six-Cylinder Diesel Engine Furnishes the Power

J. F. DUTHIE & CO., Seattle, are constructing a motor-driven ferry boat for the port of Seattle from plans drawn by Lee & Brinton, naval architects, Seattle. The vessel will be of the double-ended ferry-boat type, 100 feet long, 28 feet beam and 10 feet deep. The boat is designed for passengers only and the two decks will be given over to their use. On the main deck will be located cabins for men and women and accommodations will be provided for 300.

The scantlings called for in the specifications of the hull are up to the requirements of the American Bureau of Shipping. The propeller posts and shaft logs are oak. The rubbing strip on the bottom of the keel and the guard are iron bark. All other lumber in the hull is fir, treated with carbolinium. All longitudinal members have locked scarphs and run in long lengths; some of these members are in one piece 90 feet long. The floor timbers and frames are double, sawn from 5-inch flitch, molded at the foot 10 inches and at the deck 6 inches. The keel is 12 x 12 inches, the clamps 4 inches and the ceiling and planking 3 inches. Screw bolts are used for fastenings in all clamps, keelsons, etc. There are two trusses which are run the full length of the vessel. The engine logs are 18 x 18 inches and 47 feet long. There are four bulkheads dividing the vessel into five watertight compartments. These are so arranged that the vessel will have her deck well above water with any one compartment flooded and the vessel will not sink if all are flooded. The hull is to be salted and care has been taken in the design so that all parts are ventilated.

Plenty of Windows

The cabins are well lighted from large sash on the side and from a skylight at the center running the full length of the house. Life preservers are placed over the seats in the cabins and in boxes on the decks. Companionways will lead from each end of the deck house to the upper deck. All interior finish will be simple and plain.

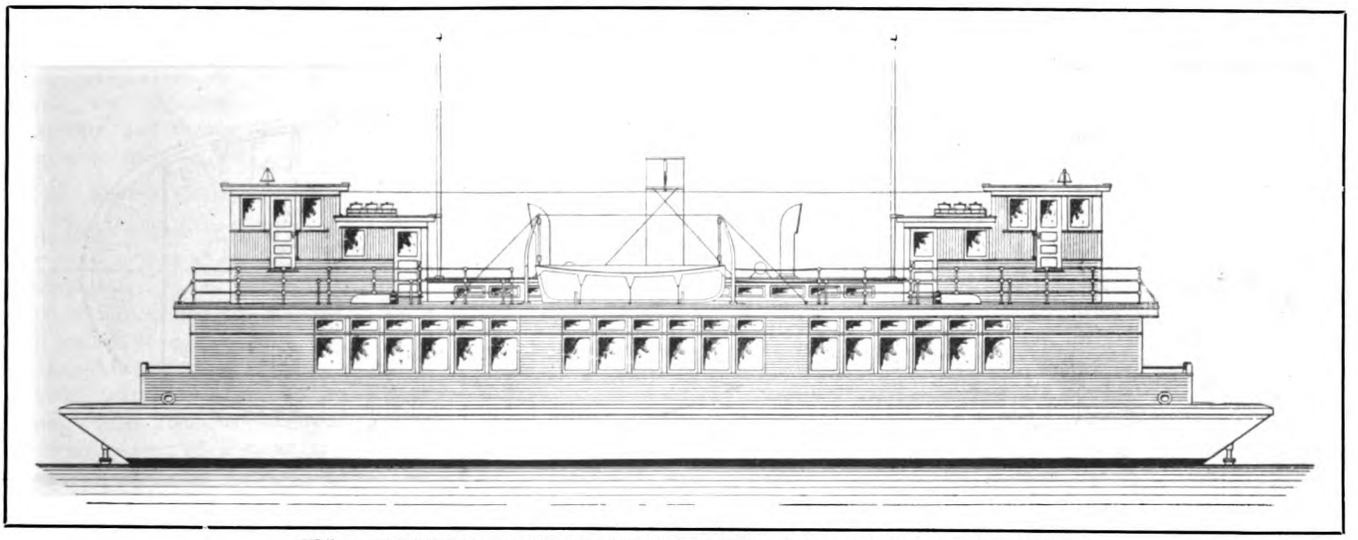

FIG. 1—PROFILE OF MOTOR-DRIVEN FERRY FOR PORT OF SEATTLE

The vessel will be propelled with a 6-cylinder 9 x 13-inch two-cycle Southwark-Harris diesel engine, developing 225 brake-horsepower at 300 revolutions per minute, which should give a speed of nearly 10 knots. There will be a propeller at each end connected to the engine through friction clutches, but the stern wheel only will be driven except when making a landing. This method was adopted on account of the large amount of drift wood usually afloat in the bay; the forward wheel is allowed to run idle when not coupled.

A two-cylinder San Francisco Standard gas engine of 8 horsepower will be installed as an auxiliary. To it will be connected the auxiliary air compressor, the electric generator and the fire and bilge pump. The fire lines will have three outlets, one at each end of the main deck and one on the upper deck about amidships. There will be, in addition to the fire pump, two brass-lined hand pumps which may be used either for fire purposes or for pumping out the bilge. For heating the boat in cold weather there will be a small boiler using kerosene for fuel; hot water radiators are placed in the cabins, toilet rooms and pilot houses. All sea valves are bolted to a cast iron seachest. This is covered with a galvanized strainer. A heavy piece of zinc is bolted inside of the chest and it may be renewed any time the vessel is hauled from the water. Electricity will be used for lighting the boat. The lamps are of the semi-direct type working under a pressure of 115 volts, supplied from a 3-kilowatt General Electric dynamo. There will also be a low-voltage system for use in case of accident to the main system. Current for this will be obtained from an Edison storage battery working under six volts pressure. This battery will be wired in series with the main lamps so it will be kept constantly charged.

There are two toilet rooms, one for women and one for men. Water for the sanitary system will be pumped from the sea to the supply tank by the bilge pump on the main engine. The water closets will be of the syphon jet low pressure type fitted for salt water service. Esti-

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mates indicate that the cost of operating this ferry will be very much lower than if steam had been employed for the propelling power. The distance across the bay is slightly less than two miles and the total time the engines will be working for the round trip should not be over 25 minutes. The engine will run on about 12 gallons of oil an hour. With the price of oil at 3 cents per gallon, the trip across and back will cost 15 cents for fuel. The crew will consist of a captain, an engineer and two deck hands. Later it is expected that the controls for the engine will be placed in the pilothouse and the engine will be governed by the captain by means of compressed air. When that is done one of the deck hands will be dispensed with and the cost of operation further decreased.

New Patents

Copies of any one of the following patents can be obtained by sending 15 cents in stamps to Siggers & Siggers, patent lawyers, Suite 11, National Union building, Washington, D. C., by mentioning *The Marine Review*:

1,177,625—Life boat. William Hopper, Jefferson, Ia.

1,177,698—Internal combustion engine. John Good, Brooklyn, N. Y.

1,177,809—Internal combustion engine. Fred J. Rode, Milwaukee, Wis.

1,177,889—Means for raising submerged bodies. Charles F. Ostergren and John Lundstedt, Helena, Mont.

1,178,094—Apparatus for locating sunken vessels. John F. Neal and Dorel Neal, Kokomo, Ind.

1,178,407—Submarine signaling and salvage apparatus. Rokuro Okusa, Fresno, Cal.

1,178,420—Self-leveling ship's table. Horace N. Sibley, Shreveport, La., assignor of one-half to Thomas E. Collins, Shreveport, La.

1,178,421—Combined mattress and life preserver. Charles T. Smith, Nabton, Wash.

1,178,849—Device for coaling ships. Boyd M. Gillespie, Indianapolis, Ind.

1,178,874—Life preserver. Nick K. Ramos, Lansing, Mich.

1,178,915—Internal combustion engine. James Guthrie, Jackson, Mich., assignor to Briscoe Motor Co., Inc., Jackson, Mich.

1,178,972—Charge-forming device for internal combustion engines. James J. Tracy, Cleveland.

1,179,053—Internal combustion engine. Willard L. Twombly, New York, assignor by mesne assignments to Twombly Motors Co., New York.

1,179,054—Internal combustion engine. Willard I. Twombley, New York, assignor by mesne assignments, to Twombly Motors Co., New York.

1,179,113—Armor plating for battleships. Walther Kurze, Niederlossnitz, near Dresden, Germany, assignor to the firm of H. P. Kuehne, Neiderlossnitz.

1,179,148—Subfloating body. Nils Wilhelm Uhr, Gottenborg, and Johan Hjalmar Sandberg, Stockholm, Sweden.

Re. 14,110 — Life preserver. Oscar A. Youngren, Sheridan, Wyo., assignor to National Life Preserver Co., Sheridan, Wyo.

Ore on Dock May 1

Statistics gathered by *The Marine Review* from the various dock managers at Lake Erie ports show that the amount of ore on Lake Erie docks May 1 of the present year was 3,343,405 gross tons, as against 6,092,303 tons in 1915, a decrease of 2,748,898 tons.

The total rail shipments from Lake Erie ports to furnaces during the winter season (Dec. 1 to May 1) aggregate 5,566,946 tons, viz.:

	Tons.
On dock Lake Erie ports, Dec. 1, 1915	8,910,351
On dock May 1, 1916	3,343,405
By rail to furnaces, winter of 1915-1916	5,566,946

Adding these winter shipments to 35,149,412 tons, the amount shipped to furnaces during the navigation season of 1915, gives 40,716,358 tons as the entire consumption of ore from Lake Erie ports during the year ending May 1, 1916, as against 25,230,489 tons for the year ending May 1, 1915, 39,089,319 tons for the year ending May 1, 1914, 37,437,269 tons for the year ending May 1, 1913, and 26,428,-1912. Comparative figures to 1910 799 tons for the year ending May 1, were published in the June, 1915, issue of *The Marine Review*, page 223.

The following table shows the amount of ore on dock at the close of the navigation season, 1915, and the opening of navigation in 1916. The figures of ore on dock May 1 include tonnage received and placed on dock during April.

Port.	May 1, 1916.	Dec. 1, 1915.
Buffalo	187,498	326,800
Erie	342,866	589,355
Conneaut	41,080	1,216,686
Ashtabula	1,176,142	2,870,204
Fairport	198,636	413,994
Cleveland	772,721	1,795,962
Lorain	173,771	824,988
Huron	286,054	558,692
Sandusky	.....	1,871
Toledo	164,637	311,799
Total	3,343,405	8,910,351

Out of a total movement of 1,658,-411 tons of ore shipped during April, 1916, 409,200 tons went to Lake Erie ports, distributed as follows:

Port.	Gross tons.
Buffalo	72,947
Erie	14,007
Conneaut	90,443
Ashtabula	102,102
Fairport	11,163
Cleveland	69,727
Lorain	20,652
Huron	12,638
Toledo	15,521
Total	409,200

Ore Shipments

Ore shipments on the Great Lakes during April aggregated 1,658,411 tons, compared with 503,832 tons in April, 1915, an increase of 1,154,579 tons. This record movement was accomplished under most unfavorable conditions, and is 138,106 tons in excess of the previous high mark of April, 1910, when the movement totaled 1,520,305 tons.

Following are the shipments by ports during April, 1916, with comparative data for 1915:

Port.	April, 1915.	April, 1916.
Escanaba	49,307	398,214
Marquette	4,438	53,258
Ashland	43,949	147,852
Superior	87,175	211,340
Duluth	174,989	538,281
Two Harbors	143,974	309,466
Total	503,832	1,658,411
1916 increase	.....	1,154,579

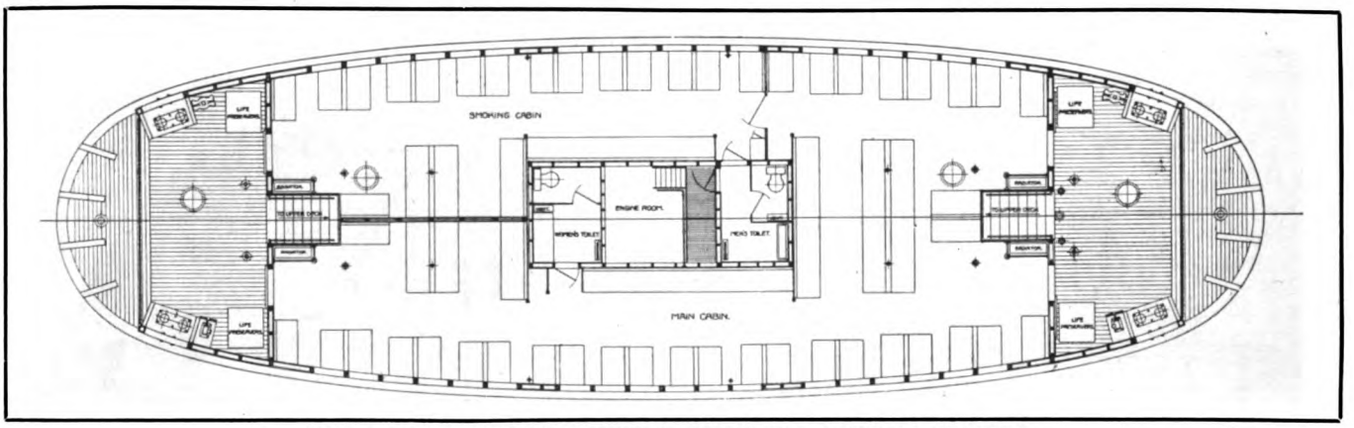

FIG. 2—PLAN OF MOTOR-DRIVEN FERRY FOR PORT OF SEATTLE

Sells Oil Engines

The Marine Oil Engine Co., Inc., New York, has sold six 240-horsepower, 4-cylinder, direct-reversible oil engines to the J. A. Eachern Co., Seattle, Wash., for installation in three auxiliary schooners to be built on the Columbia river. These schooners will have a capacity for carrying 1,500,000 feet of lumber.

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Revive Lake Erie—Ohio River Canal

Pennsylvania Interests Back of New Project—Proposed Route of Canal and Estimated Costs of Handling Freight

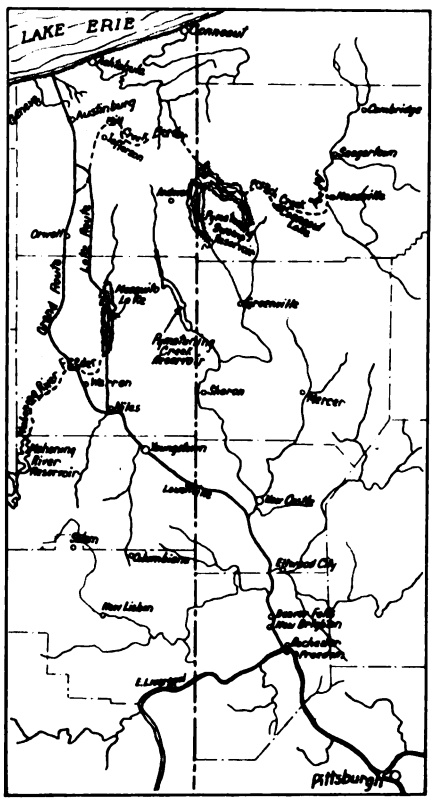
By G. F. Stickney

THE construction of a canal to connect Lake Erie with the Ohio river has been agitated at various times since the beginning of the last century. In the war department at Washington, is a copy of a map, dated 1824, of the country between Pittsburgh and Lake Erie, showing the proposed routes of the Ohio and Erie canal. A canal was actually constructed from the Ohio river at Rochester to Erie, Pa., along from 1831 to 1846, and this canal remained in operation until a few years after the close of the civil war, being finally abandoned in 1871. This canal had a depth of 4 feet. It was known as the Erie Canal of Pennsylvania, and was located in the valleys of the Beaver and Shenango rivers as far as Greenville, and thence passed across the country to the lake at Erie.

Several Surveys Made

In 1889, a commission of five members was appointed by the governor of Pennsylvania, to determine the feasibility of connecting the waters of Lake Erie and the Ohio river by a ship canal. After several months spent in making surveys and in examining routes, this commission recommended the construction of a canal from Davis island, in the Ohio river, to Lake Erie at Conneaut Harbor, a distance of 126 miles, to be located in the Ohio, Beaver and Shenango rivers and passing through Pymatuning swamp, and on down the lake slope to Conneaut Harbor. The channel was to be 15 feet deep and 100 feet wide on the bottom. There were to be 51 locks of sufficient size to pass boats 300 feet long and 44 feet wide. The estimated cost was $26,375,188. No action was taken on this report.

The chamber of commerce of Pittsburgh became interested in the canal project in 1895 and undertook a thorough investigation of the feasibility and cost of a waterway. Surveys were made and estimates were prepared by engineers, who concluded that the project was not only feasible, but might be profitably undertaken by private capital. Nothing resulted from this investigation, however, and the matter lapsed, to be revived by the Merchants and Manufacturers' Association of Pittsburgh in 1905. Considerable interest was aroused at this time, and a company, known as the Lake Erie & Ohio River Ship Canal Co., was formed to construct the canal. The company made new surveys and estimates, but private capital was not available and the canal was again laid upon the shelf.



ROUTE FOR PROPOSED CANAL

Many persons who, through their study of the proposition, had become firm believers in the idea, combined to form the Lake Erie and Ohio River Ship Canal Association for the purpose of promoting the enterprise, and, as a result of their efforts, an act was passed by the Legislature of Pennsylvania, in June, 1913, appropriating $150,000 for the purpose of making surveys and preparing estimates for a canal between Lake Erie and the Ohio river, and providing for the appointment of a board of five members to carry out the provisions of this act. The members of the board are William A. Magee, president; Col. Thomas W. Symons, U. S. A.; Tom P. Sloan, A. S. McSwigan and James A. Chambers, and they employed the writer to take charge of the engineering work and to prepare estimates for the canal.

Extensive surveys have been made of routes for the canal, reservoir sites, and for feeder channels. Borings have been made at intervals of about one-fourth mile along the selected routes, which, together with information obtained from examination of wells and the observation of out-cropping rock, furnished data for determining the character materials to be excavated and the foundations for structures.

Route of Canal

The main route selected for investigation as shown in the accompanying illustration, commences at the mouth of the Beaver river, where it empties into the Ohio river, and follows up the former stream to the junction of the Mahoning and the Shenango rivers; thence up the Mahoning to the mouth of Mosquito creek, at Niles, O.; thence up the creek into Greene township, where the line leaves the Mahoning river valley and crosses into the Grand river drainage basin, following along the eastern side hills of the latter as far as Three Brothers creek; thence swinging to the west, down the creek to a point just beyond the Ashtabula branch of the Pennsylvania railroad, where a turn to the north is made and the line of the railroad is followed to the vicinity of Austinburg, O.; thence swinging slightly to the left the route continues in a northerly direction across the divide which separates the Grand river valley from the lake slope; passes down the slope to Lake Erie, near the mouth of Indian creek, at a point some six miles west of Ashtabula, O. The length is 101.47 miles. An alternate route over the summit continues up the Mahoning river from the mouth of Mosquito creek to a point about two miles west of Warren, O.; thence swinging to the north, passes out of the Mahoning river valley and into the Grand river valley, following the eastern side hills of the latter to a junction with the previously described route at a point midway between Rock Creek and Eagleville, beyond which it is common with the other route. This line is 103.98 miles long. A branch 3.73 miles long extends up the Shenango river to Washington street, in Newcastle, Pa.

Presented at a recent meeting of the Engineers' Society of Western Pennsylvania. The author, G. F. Stickney, is consulting engineer in charge. Lake Erie and Ohio river canal.

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The level above dam No. 6 in the Ohio river, which establishes the water surface at the mouth of the Beaver river, is elevation 668.27 feet above sea level, while the mean level of Lake Erie is at elevation 573, making the difference in level between the two ends of the proposed canal 95.27 feet. The summit level of the first route, covering a stretch of 27.27 miles, is at elevation 900, requiring an ascent of 231.73 feet from the Ohio river and a descent of 327 feet to the lake, or a total lockage height of 558.73 feet. This is surmounted by 26 locks. On the southern end are 15 locks, with lifts varying from a minimum of 10 feet to a maximum of 20.3 feet, while on the northern end of the summit are 11 locks, nine with lifts of 30 feet each and two with lifts of 28.5 feet each. A lake about 10 miles long and from one to one and one-fourth miles wide will be formed at the southern end of the summit level.

On the alternate route the summit level is 32.14 miles long, with water surface at elevation of 870. There are 24 locks on this route. The ascent from the Ohio river is made with 14 locks, having lifts of 10 to 20 feet, and aggregating a total height of 201.73 feet, and the decent to the lake of 297 feet is accomplished with 10 locks, eight of which have 30-foot lifts and two with lifts of 28.5 feet each. The southern end of the summit level on this route will be in a deep cut for a distance of five miles, and the total lockage height is 498.73 feet. The location and lifts of the various locks are shown in the accompanying table. The first route will have 49.90 miles of canalized river, 8.52 miles of lake channel, and 43.05 miles of land line, while the second route will have 59.03 miles of canalized river and 44.95 miles of land line.

Size of Locks

In preparing the preliminary estimate for this canal, two sizes of locks have been selected, and three depths of channel, 9, 12 and 15 feet, respectively, with other dimensions suitable for boats of the maximum size that the locks will accommodate.

The smaller lock, which has the same dimensions as those on the New York state barge canal, and which is also the same as the Canadian locks along the St. Lawrence river, will have a chamber 45 feet wide by 340 feet long between hollow quoins and will accommodate a boat 43 feet wide by 300 feet long.

The larger lock corresponds in size to those on the Monongahela river, being 56 feet wide and 400 feet long in the chamber. It will pass boats 54 feet wide by 350 feet long. The draft of a boat when fully loaded should be two feet less than the depth of the channel, for ease of operation. The channel must be of such width that boats going in opposite directions may readily pass, and the cross-sectional area of the waterway should not be less than four and one-half times the cross-sectional area of the boat below the water line, in order that the tractive resistance will not be excessive.

The bottom width of the channel will be 140 feet if small locks are used, or 180 feet if the larger size is selected. In the Beaver river and through Mosquito lake, where the shore line is irregular and the channel lines are not well defined by the banks, the bottom width will be 200 feet. The sides of the channels, when in earth, will be covered by stone paving extending to a depth of 2½ feet below and 4 feet above the low water surface, to protect the slopes from wash, caused by passing boats.

At each town along the route of the canal there will be public terminals to facilitate the loading and unloading of freight from barges, while large individual shippers will provide their own terminal facilities. The public terminals will consist of a vertical wall, about 300 feet long, with a basin alongside sufficiently removed from the channel that a boat may be moored at the wall without obstructing the waterways. Warehouses will be built at each site to receive such freight as needs protection from the weather and suitable unloading devices will be installed. At the Lake Erie end of the canal, a large terminal with facilities for transferring freight from lake vessels to canal boats will be necessary.

Vessels with the free board and height of upper works necessary for lake navigation, are not suitable for use on the canal that is crossed by numerous bridges. In addition, the cost of lake vessels and the expense of operation is too great to allow them to compete with boats built solely for inland navigation. The type of boat best adapted for transportation of bulk freight and package freight, on the canal, is believed to be a power-driven barge of the largest dimensions that the depth of water and size of locks will accommodate and which requires a minimum height of bridges. This type has been developed by the Alabama & New Orleans Transportation Co. for the carriage of coal and other freight between New Orleans and the Alabama coal fields on the Black Warrior river. These barges are of steel construction, 240 feet long, 32 feet wide, and 8 feet deep The cargo is carried on the deck in a cargo box having a capacity of 1,000 tons. The barge is operated at a speed of from six to eight miles per hour by internal combustion engines driving twin screws, and using gas for fuel. This gas is produced from coal or refuse coke, which latter is obtained at a low cost. The machinery and fuel occupy little space and a crew of but nine men is required. The cost of operating this barge for one round trip from New Orleans to Gilmore, Ala., and return, a total distance of 960 miles, was $356.95, and with full cargoes both ways this would amount to 0.37 mills per ton mile.

Plans for bulk and package freight carriers of this type, suitable for the proposed canal, with the larger size of lock, have been prepared by a marine architect, together with the estimated cost of operation. From these estimates the approximate cost of transporting freight for a distance of 150 miles, from the lake terminal to points on the Ohio or Monongahela river, has been determined as follows:

BULK FREIGHT CARRIERS, 340 FT. LONG AND 54 FT. WIDE.

Depth of canal, feet.	Cost per ton, cents.	Cost per ton mile, mills.
9	10	0.67
12	7.6	0.51
15	6.5	0.43

PACKAGE FREIGHT CARRIERS, 340 FT. LONG AND 54 FT. WIDE.

Depth of canal, feet.	Cost per ton, cents.	Cost per ton mile, mills.
9	43	2.89
12	35.4	2.36
15	30.5	2.03

The ultimate capacity of the canal is fixed by the number of lockages that can be made and by the tonnage of the boats. The number of lockages depends upon the time necessary to operate a lock and on the movement of boats. The first item can readily be determined but the second cannot be calculated with any degree of accuracy, since large boats must move slowly while entering or leaving a lock.

Capacities of Locks

The best information available on this subject is found in the annual report of St. Mary's Falls canal at Sault Ste. Marie, Mich., which has the largest traffic of any artificial waterway in the world. The maximum number of lockages, by a single lock, was made in 1895 through the Wetzel lock, then the only one in operation. During a period of 231 days 16,793 vessels passed through this lock in 7,039 lockages, an average of 2.39 boats at a lockage and 30.47 lockages per day. The traffic through the canal was so heavy that boats were delayed an average of five hours 48 minutes, and the capacity of the lock may be assumed to have been reached. The lock can be operated in ten minutes. The greatest number of lockages ever made in 24 hours is 41.

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which record has been reached but three times in a period of 26 years.

From these facts, it is believed that 8,000 lockages, of single boats, may be made in a season of eight months. The dead weight carrying capacity depends upon the character of freight carried and also whether it is package freight or in bulk. The approximate capacity of boats of the maximum dimensions for the various sizes of locks and depths of canal are as follows:

	Boats 43 ft. by 300 ft. Locks 45 ft. by 340 ft.		Boats 54 ft. by 350 ft. Locks 56 ft. by 400 ft.	
Depth of canal.	Bulk freight carrier.	Package freight carrier.	Bulk freight carrier.	Package freight carrier.
Feet.	Tons.	Tons.	Tons.	Tons.
9.....	1900	550	2800	800
12.....	3050	775	4500	1130
15.....	4150	1020	6100	1500

As a large part of the traffic over this canal would undoubtedly be bulk freight, such as coal and iron ore, it is evident that the canal will provide for a very large tonnage, and by duplicating the locks the amount may be doubled.

In determining the cost of transportation on the canal, the figures were obtained from the following, which includes allowances for all detentions of boats in loading and unloading:

ESTIMATED COST OF TRANSPORTATION ON THE CANAL BASED ON A SEASON OF EIGHT MONTHS PER YEAR FOR CONTINUOUS OPERATIONS WITH FULL CARGOES

Bulk Freight Carriers.

Size of Boat.....	340 ft. x 54 ft. x 9 ft.	340 ft. x 54 ft. x 12 ft.	340 ft. x 54 ft. x 15 ft.
Capacity, tons.....	2,775	4,400	5,950
Value	$90,000	$93,500	$97,000
Fixed Charges:			
Interest at 6 per cent	$5,400	$5,610	$5,820
Depreciation at 3 per cent	2,700	2,805	2,910
Upkeep at 3 per cent	2,700	2,805	2,910
Insurance at 5 per cent	4,500	4,675	4,850
Operating expenses:			
Management	$ 900	$ 900	$ 900
Crew, including subsistence.....	6,160	6,160	6,160
Fuel, Oil, etc.....	1,640	1,852	2,048
Profits at 10 per cent	9,000	9,350	9,700
	$33,000	$34,157	$35,298
Trips of 150 miles	118	102	91
Freight moved, tons	327,450	448,800	541,450
Cost per ton, cents	10	7.6	6.5

Package Freight Carriers.

Size of Boat.....	340 ft. x 54 ft. x 9 ft.	340 ft. x 54 ft. x 12 ft.	340 ft. x 54 ft. x 15 ft.
Capacity, tons.....	784	1,112	1,464
Value	$106,500	$111,500	$115,000
Fixed Charges:			
Interest at 6 per cent	$6,390	$6,690	$6,900
Depreciation at 3 per cent	3,195	3,345	3,450
Upkeep at 3 per cent	3,195	3,345	3,450
Insurance at 5 per cent	5,325	5,575	5,750
Operating expenses:			
Management	$ 900	$ 900	$ 900
Crew, including subsistence.....	6,160	6,160	6,160
Fuel, Oils, etc.....	1,640	1,848	2,048
Profits at 10 per cent	10,650	11,150	11,500
	$37,455	$39,013	$40,158
Trips of 150 miles	111	99	90
Freight moved, tons	87,024	110,088	131,760
Cost per ton, cents	4.3	3.54	3.05

The cost of loading and unloading cargoes of iron ore or coal with modern freight-handling machinery is 4 to 5 cents per ton. Package freight may be handled by stevedores for 29 cents per ton.

The type of barge proposed for use on the canal while not suitable for long trips on the lake would be able to go to Cleveland without risk, or to cross over to Buffalo during fair weather, and thence on through the New York barge canal to the Hudson river and New York City. This would be possible, as there are harbors of refuge along the south shore of Lake Erie every 12 to 15 miles, so that the barge would never be more than an hour's run from a place of safety in case of unexpected weather. The navigation season of eight months corresponds to the open season on the Great Lakes, and there is no doubt that the canal could be operated for this length of time. Estimates of the cost of the canal have not been completed.

LIST OF LOCKS

No.	Distance from Ohio river Miles.	Lift feet.	Elevation water surface above lock.
Ohio River	0.00	....	668.3
1	0.43	11.7	680.0
2	2.95	20.0	700.0
3	4.00	20.0	720.0
4	5.92	14.0	734.0
5	11.20	10.0	744.0
6	16.67	12.0	756.0
7	22.63	18.0	774.0
8	26.21	10.0	784.0
9	29.13	14.0	798.0
10	34.95	10.0	808.0
11	38.83	20.0	828.0
12	43.62	11.0	839.0
13	50.82	20.33	859.33
14	55.61	20.34	879.67
15	58.54	20.33	900.0
16	85.81	30.0	900.0
17	86.72	30.0	870.0
18	87.50	30.0	840.0
19	95.58	30.0	810.0
20	96.26	30.0	780.0
21	96.83	30.0	750.0
22	97.30	30.0	720.0
23	97.97	30.0	690.0
24	98.42	30.0	660.0
25	100.61	28.5	630.0
26	101.11	28.5	601.5
Lake Erie	101.47	....	573.0
ALTERNATE LINE			
13	50.70	16.0	855.0
14	55.89	15.0	870.0
15	88.03	30.0	870.0
16	89.62	30.0	840.0
SHENANGO RIVER			
1a	21.95	17.0	773.0

Death of J. A. Sedgwick

Joseph A. Sedgwick, treasurer of the Fore River Ship Building Corporation, Quincy, Mass., died at his home in that city on April 14, after an illness of about seven weeks. He was 45 years of age.

Mr. Sedgwick was born in Wisconsin in 1871 and when a small boy his family removed to Akron, Ia., and at a later date to Hawarden, Ia., where his people still reside. He was educated in the public schools of Iowa and afterwards attended for three years the Highland Park Normal college in Des Moines. After his graduation, he taught in the business department of the same college. In 1894 he entered the railway mail service, where he stayed for two years. In 1896 he assumed a position in the navy yard, New York, where he was employed in the purchasing department of the bureau of construction and repair. He served there during the Spanish-American war, under Naval Constructor Francis T. Bowles. In 1901, when Constructor Bowles was made chief of the bureau of construction and repair, he had Mr. Sedgwick transferred to the department at Washington, D. C., where he was employed on similar work. Late in 1903 Mr. Sedgwick became auditor of the Fore River Ship Building Co. and afterwards treasurer.

Mr. Sedgwick was prominent in many lines of local activity at Quincy. He was a director of the local Y. M. C. A., and a past president of the Quincy Board of Trade. At the time of his death he was treasurer and director of the Fore River Ship Building Corporation, Fore River Ship Building Co., Curtis Marine Turbine Co. of the United States, Harroway-Dixon Co. and United States Mutual Liability Insurance Co., and president and director of the Quincy Co-Operative Bank.

Urge Marine Cadet School

The establishment of two training schools for merchant marine cadets, whose services would be required in the rehabilitation of the merchant marine, is provided for in a bill introduced by Representative Joshua W. Alexander, of Missouri, author of the administration's ship purchase bill. The bill authorizes the shipping board provided for in the ship purchase measure to establish a training school on the Pacific coast and one on the Atlantic coast "for the purpose of educating and training young men to become deck and engineer officers in the merchant marine".

It is provided that the cadets shall be appointed by the board from among candidates who have had at least six months' experience as naval apprentice seamen or two years at sea in the merchant marine. Competitive examinations are authorized, and graduates of the training schools must promise to serve, if employment can be found, for five years subsequent to graduation on vessels of the merchant marine, army transport service, or naval auxiliary service. In addition thereto the cadets so trained shall be available as members of the naval reserve for two successive periods of four years each.

The secretary of the navy is directed to furnish the coast guard two vessels suitable for use as training

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schools. Instead of defraying the expenses of the cadets, the bill provides that each cadet shall be given an annual allowance of $500 during the course of training and out of this amount he shall defray such expenses as uniforms, books, board and other personal expenses except travel. It is estimated that the cost of maintaining two training ships will be $200,000 per annum, with $20,000 additional for instructors and incidental expenses—the latter amounts to be supplied by the shipping board.

Launch Big Tanker

TEXAS, the first of four sister tank vessels which the Fore River Shipbuilding Corporation, Quincy, Mass., is building for the Texas Co., New York, was launched recently. Designed by an official of the Texas Co., this steamer is said to embody the most modern ideas in her construction. She is 430 feet in length overall, with a 56-foot molded beam and a molded depth to the upper deck of 32 feet 9 inches. She is built on the Isherwood system, and is of the two-deck type with two steel masts. Her deadweight carrying capacity is 9,100 gross tons on a draft of 25 feet 6 inches. The design provides for a raised forecastle, bridge, and poop deck, with a lower deck for package freight. Her three-cylinder triple expansion engine is supplied with steam by three single-end Scotch boilers.

The vessel's main hold is divided by watertight and oiltight bulkheads into 16 oil cargo tanks, 16 summer tanks, and several fuel oil tanks, as well as two pump rooms, a cargo hold forward, a space aft for the driving machinery, peak trimming tanks at bow and stern, and a partial double bottom.

Among the features of TEXAS' equipment is a complete steam heating system, including heater coils for the oil tanks. All the tanks are fitted with steam extinguisher pipes. A refrigerating plant and a Marconi wireless set are also provided.

Personals

M. L. White has been appointed manager of the Great Lakes Transit Corporation, Buffalo, with headquarters at 72 Water street, to succeed Edwin T. Douglass, who resigned to become a member of the Eastern Grain Mill & Elevator Corporation of Buffalo. Mr. White will have general supervision of the operation and maintenance of both freight and passenger vessels, commissary and

M. L. WHITE

store department, and all port agencies of the company.

John B. Austin Jr., has been elected vice president and appointed general manager of the Gaston, Williams & Wigmore Steamship Corporation. Mr. Austin for 11 years has been connected wtih the Long Island railroad and prior to that with the Pennsylvania railroad.

Edwin T. Douglass, formerly general manager of the Western Transit Co., Buffalo, has been elected a director of the Eastern Grain, Mill & Elevator Corporation, Marine National Bank building, Buffalo, and has been appointed manager of the concrete elevator, with jurisdiction over the lake grain interests of this corporation.

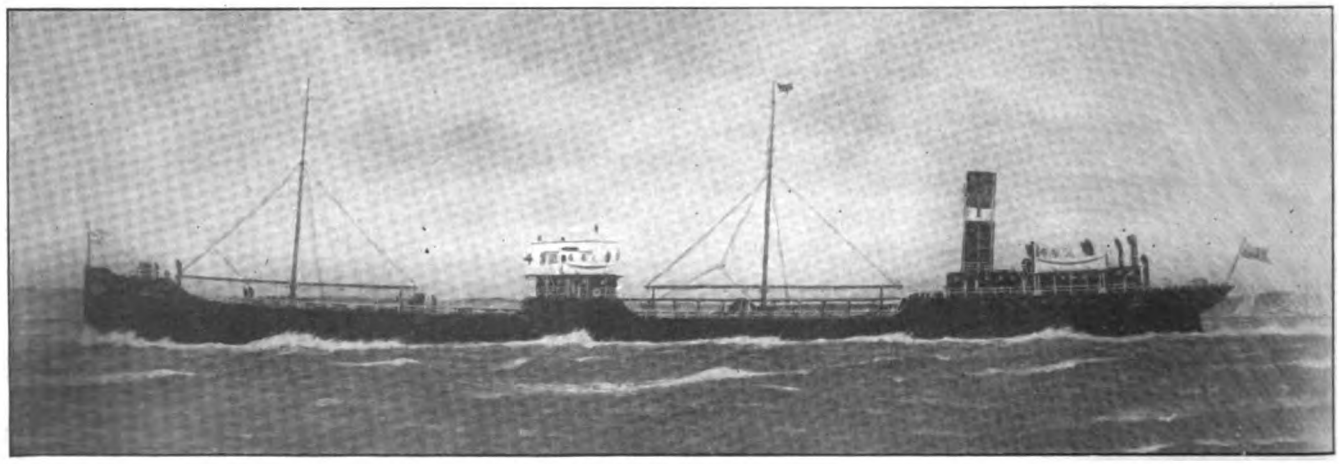
Merger Completed

The merger of the Penn Steel Castings & Machine Co., Chester, Pa., and the Baldt Steel Co., of New Castle, Del., has been perfected. These companies have been in the steel casting manufacturing business for 20 and 10 years respectively, and the new concern will be known as the Penn Marine & Ordnance Castings Co., Inc. It will have executive, general and sales offices at 132 South Fifteenth street, Philadelphia. The officers are: Rodney Thayer, president; Walter S. Bickley, vice president; C. Ferris Jemison, secretary, and Ivers

New Transatlantic Line

It is announced from Petrograd that direct steamship service between Finland and the United States will be opened soon by a company which has just been formed. The capital required was easily found in Finland and America, the latter subscribing more than $2,000,000. The new line is expected to emancipate Russia from the German lines with headquarters in Bremen and Hamburg.

Scarcity of vessels and the seriousness of the ocean mail situation were demonstrated recently, when the Norwegian steamship HERMAIN, ore laden, arrived in Philadelphia from Rio Janeiro, bringing seven sacks of mail. This is the first time in the history of the port that a vessel carrying ore has arrived with the United States mail aboard, such ships generally being the slowest in the service.



NEW TANK STEAMSHIP TEXAS

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On the Coasts, Lakes and Rivers

What's Doing and Who's Doing It

Lake Navigation Opens With a Rush

By A. A. Eiben

AN ANNOUNCEMENT was made recently by engineers of the Pittsburgh & Conneaut Dock Co., Conneaut, and the Bessemer & Lake Erie Railroad Co., subsidiaries of the United States Steel Corporation, that the dock company will build a new concrete dock at Conneaut, opposite dock No. 1, to cost approximately $3,000,000. The new dock will be 2,050 feet long and 1,015 feet wide, of concrete and steel construction, and will be equipped with eight electric Hulett machines, two 700-foot conveyor bridges, and will have six to eight tracks running around it. Four vessels will be able to unload at one time, and the dock will have a storage capacity of 8,800,000 tons of ore. The new dock, it is reported, will be the largest in the world, and work on the new structure will begin at once.

* * *

The steamer GLADSTONE and barge GROVER, which have been aground in Erie bay for the past four years, will be raised, towed to Cleveland and fitted out for lake service. The vessels are owned by M. A. Bradley, Cleveland.

* * *

The steamer GISLA, building for Norwegian interests at the Wyandotte yard of the American Ship Building Co., was recently launched and will leave for the coast June 22. The steamer is 261 feet long, 33 feet beam and 20 feet deep.

* * *

The receipts of ore at Ashtabula during April were more than three times the amount received in April, 1915.

* * *

The East End dock at Superior, Wis., formerly operated by the C. Reiss Coal Co. under lease, was recently taken over by the Pittsburgh & Ashland Coal & Dock Co. This dock has a capacity of 125,000 tons, and is in charge of W. J. Mars, manager, and Alex Brotherton, superintendent. The Reiss company is enlarging its remaining Superior dock property by 150,000 tons and installing a new rig. These improvements will be completed in July and will cost approximately $125,000.

* * *

The Cleveland Transportation Co., A. E. R. Schneider, manager, Cleveland, was recently formed to operate the steamer LEWISTON.

* * *

Captain Joseph Valentine, who completed more than 39 years of continuous service at the Hammond coast guard station, Lake Huron, recently retired with an honorable discharge. Hammond station was one of the first constructed on the Great Lakes after the organization of the life saving service, and Captain Valentine entered it as a surfman in October, 1876.

* * *

The steamer IOCOLITE, building at the yard of the Collingwood Ship Building Co., Collingwood, Ont., was launched recently. The IOCOLITE is the second of the tankers building by this company for the Imperial Oil Co. to be launched. Contracts for three vessels of her class and for two ocean-going steamers have been given the Collingwood company by the Imperial Oil Co.

* * *

The work of rebuilding the steamer L. C. WALDO, which was wrecked in the storm of November, 1913, has been completed and the steamer is again in commission. WALDO was purchased from the underwriters by the Matthews Steamship Co., Toronto, and is now known as RIVERTON.

* * *

In response to an inquiry directed to the secretary of state, with reference to the attitude of Canadian authorities in regard to alien sailors on neutral boats arriving at Canadian ports, President William Livingstone of the Lake Carriers' Association, received the following reply:

"I am informed by the Canadian department of external affairs that these regulations are not applicable to river and lake ports and that any instructions that have been issued in that behalf have been canceled. The department states, however, a rule for such removal from neutral vessels will be enforced at all seaports."

* * *

Work is being rushed on the new solid concrete elevator building for Armour & Co. at 125th St., South Chicago, in an attempt to have it in readiness for the fall crop. The new elevator will be modern in every respect and will be one of the most modern in South Chicago.

* * *

The steamers L. E. HINES, WILLIAM CASTLE RHODES, HARVEY H. BROWN and MARYLAND, which have been sold to coast interests, are being fitted out for salt water service and will leave the Great Lakes district in a few weeks.

* * *

Captain William D. Hamilton, president of the Hamilton Transportation Co., Chicago, died suddenly on May 2 on a Michigan Central train enroute to Buffalo. Death was due to heart failure. Captain Hamilton was born in Ogdensburg, N. Y., in 1862, and had been identified with the marine trade on the Great Lakes since boyhood. In 1898 he became associated with the Edward Hines Lumber Co. and in 1915 formed the Hamilton Transportation Co., which took over the vessels of the Hines fleet. He was secretary of the Lumber Carriers' Association and grand secretary of the Ship Masters' Association at the time of his death. He is survived by a widow and six children.

* * *

M. E. Curtiss was recently appointed night foreman of the Pittsburgh & Conneaut Dock Co., Conneaut. Mr. Curtiss was formerly general foreman of the docks but resigned several years ago.

"Where Rolls the Oregon"

By Kenneth McAlpine

AN INNOVATION in ship construction was marked April 15, by the launching of the auxiliary schooner CITY OF PORTLAND at the plant of the St. Helens Ship Building Co., owned by the Charles R. McCormick interests, at St. Helens, on the lower Columbia river. The vessel's dimensions are: length 276 feet, beam 48.3 feet, gross tonnage 1,791, and net tonnage 1,649. This ship is one of four to be built by the McCormick interests, the others to be named CITY OF ST. HELENS, CITY OF ASTORIA and CITY OF EUREKA. The new vessel was given the class of A1 by the representative of the Bureau Veritas. CITY OF PORTLAND is to be driven by two 320 horsepower Bollinder's semi-diesel engines, and will be schooner rigged with four masts for fair weather sailing.

* * *

The war has had an important effect on ship building in this district. Aside from CITY OF PORTLAND, built at St. Helens, the sister ship CITY OF ST. HELENS is under way at the same yards. A smaller steam schooner for Mobile, Ala., interests is being built, next to CITY OF HELENS and late advices state that this vessel has been sold and a contract given by the original owner for a similar vessel. In addition, two motor ships, CITY OF ASTORIA and CITY OF EUREKA are to be built either at St. Helens or at a wooden ship building plant to be established at or near Portland by the McCormick interests. The Wilson brothers ship yard at Astoria has been given a contract by the McCormick Navigation Co. for two auxiliary power lumber schooners. The proposed craft will have a carrying capacity of 1,500,000 feet of lumber and will cost approximately $135,000 apiece. The schooners will be equipped with semi-diesel engines and in addition will have power winches. The McEachren yard at Astoria, has contracted for two auxiliary wooden vessels. The Kruse and Banks ship yard at Coos bay has

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two vessels under way. It is reported that the yards at Bandon will be started up shortly under the supervision of Mr. Nolty, formerly with the St. Helens company, and will build two carriers with a capacity of 1,000,000 feet each for the Fyfe Lumber Co.

* * *

Work has been started at the plant of the Northwest Steel Co., Portland, by the Port of Portland dredges preparatory to building the ways for the construction of two steel freighters for Hannevig & Johnston, New York, ship brokers. The contracts were taken jointly by the Northwest Steel Co. and the Willamette Iron & Steel Co. The former will build the hulls and the latter the engines and boilers. These ships are to be of 8,800 tons dead weight and will have engines capable of driving them at a rate of 11½ knots per hour. They are to cost approximately $950,000 apiece and the contract calls for delivery of the first vessel in one year and the second a few months later.

* * *

Spokane capitalists, in conjunction with local interests, have about completed the formation of ship building company with the announced intention of building wooden auxiliary ships, at a point near Portland. The company will be headed by A. F. Fleweling, Spokane This plant, together with the proposed McCormick plant, will give Portland a big impetus as a ship building center and will mean additional employment for about 1,000 men in conjunction with the steel ships to be built by the Northwest Steel Co.

* * *

Joseph Supple has received offers to build two ships. A passenger and freight steamer for the Kitsap County Transportation Co., Seattle, is practically completed at the Supple yards.

* * *

Portland will soon receive its first shipment of copra, which is under way on the schooner JOHN A. CAMPBELL from Sydney consigned to the Kaola Co. This company has a factory at Portland and recently completed a mill for extracting the oil from the copra. Copra in the future will probably comprise a part of the cargoes of the wooden motor ships on their return from the Antipodes.

* * *

The early New England ship builders have long held a high and deserved reputation . This was emphasized recently when the American barge AMY TURNER was sold to British Columbia interests who will put her in the oriental trade after she has been overhauled and masts stepped in her. AMY TURNER was built at Boston in 1877 of oak and hard pine and it is said that her timbers are in nearly as good condition as the day she was launched.

Boston Bay News

By George S. Hudson

BRITISH schooners are earning big freight money transporting grain from Boston to Nova Scotia. The cereal comes in bond from the west and is loaded into vessels at the B. & A. terminal, that method being cheaper than all-rail. The schooners carry about 20,000 bushels and generally go to ports inaccessible to heavy-draft vessels.

* * *

A cargo of molasses in bulk arrived in Boston from San Juan, P. R., early this month in the old United States gunboat DETROIT, which has been fitted with tanks and is operated by the Inter-Ocean Transportation Co. This is the first shipment of the kind, and is to be followed by others. DETROIT was towed by the steamer TOLTEC.

* * *

Fields S. Pendleton is having a five-masted schooner built at Noank, Conn., to be equipped with an oil-burning motor. The vessel is of composite construction with capacity of 3,000 tons and will cost $200,000.

* * *

Capt. O. G. Haines, U. S. local inspector of hulls, has just received from Washington a ruling of the steamboat inspection service, which places mineral sea oil in the same class as refined petroleum.

* * *

Coast guard cutters hereafter will respond only to vessels actually in distress, the recent announcement being prompted by knowledge that some masters of sail vessels have been seeking tow from port to port in calms or head winds.

* * *

One of the longest passages on record from Huelva, Spain, to Boston was that of the British freighter SLINGSBY, two months being required to cover the distance. Gales pounded the ship so severely that Captain Summerfield had to head up for St. Michaels where extensive repairs were necessary.

* * *

The steam trawler HEROINE has been purchased by the Commonwealth Fisheries Co. and will run regularly to the Boston market.

* * *

The five-masted schooner MAGNUS MANSON, recently at Boston from Cienfuegos, Cuba, with a cargo of sugar, has been sold to the McIntire Lumber Co., Mobile, Ala., for $110,000 and probably will engage in trade with Europe.

* * *

The barge GRACE D. CHAMBERS will be restored to schooner rig and engage in foreign trade. The work is to be done in Boston.

* * *

A full cargo of rum, tobacco and flour is on the way from Boston to Sekondi and Accra in the five-masted schooner ESTELLE KREIGER, Captain Nash. The next African sailing from Boston will be the four-master AUGUSTUS H. BABCOCK, whose owners will receive $80,000, the highest rate ever paid a sailing vessel for a similar voyage and exceeding by $3,000 the schooner's original cost.

German Boat Takes Wheat

By H. H. Dunn

ONE of the many peculiar twists which war gives to commerce was manifested in New Orleans in April when the steamer HOUSATONIC, flying the American flag, and laden with 150,000 bushels of wheat for the allies, left the Crescent City for Savona, Italy. The big freighter was GEORGIA, of the Hamburg-American line, which arrived in New Orleans, under the German flag, July 22, 1914. Eight days later, loaded with grain for Germany, she cleared, but, on her way down the river, was halted by wireless and turned back to the Stuyvesant docks, where her cargo was unloaded. A few days later, she again took on the wheat cargo, and dropped anchor a few miles from the mouth of the river, awaiting, apparently, an opportunity to run the blockade which a British cruiser had established outside the three-mile limit. She never was able to get away, however, and two months later again came up the river and unloaded for the second time. On April 19, 1915, she was sold to Edward F. Geer, president of the Housatonic Steamship Corporation, New York. The cargo of wheat she is now taking to the allies is the first complete shipload of its kind ever sent out of New Orleans, which seldom sees so much grain in one cargo.

HOUSATONIC was built in Glasgow, in 1890 and has a gross tonnage of 3,143, with 2,022 net. She is commanded by Captain Robert Major, an American, and manned by 36 men.

* * *

HANNIBAL, Commander George N. Haywood, U. S. N., in charge, flagship of the United States survey fleet, paid New Orleans a visit in April, to give her crew shore leave after several months of arduous work piloting the shore line of parts of Central America. At the end of April she returned to her work for the hydrographic department off the coast of Nicaragua. While HANNIBAL is chartering the reefs and shoals of Nicaragua, EAGLE is at work off Hayti, PADUCAH off Cuba, and LEONIDAS off Panama.

* * *

The French motor ship RADIOLEINE, probably the first armed oil-driven vessel to enter a United States port since the outbreak of the war, has just been given clearance papers at New Orleans, after considerable argument over her right to carry guns.

* * *

The Clooney Construction Co., Lake Charles, La., has just completed an oil barge, 190 x 39 x 13 feet, for service out of Galveston, and a stern-wheel steamer, 130 feet long, for use on the Tuxpam river, near Tampico, Mexico.

* * *

The largest bark ever seen on the gulf coast of Mississippi recently loaded 2,000,000 feet of lumber for Buenos Aires at Gulfport. She is the Russian four-master FENNIA, is 284 feet long, with a depth of 25 feet, and draws 22½ feet of water when loaded to capacity. She carries a crew of 24 men.

* * *

A five-masted schooner, costing $50,000 and constructed of yellow pine, with the exception of her masts, will be built in New Orleans for Henry Piaggio, Gulfport, Miss. This is the first ship to be built entirely of pine in the history of ship building in the south. Scarcity of oak and cedar has forced boat builders to turn to pine, and if this schooner proves a success, similar vessels will follow. She will be used in the lumber trade and will have a capacity of 1,500,000 feet.

* * *

The steamer PORTO RICO, first American vessel ever placed under Nicaraguan register, has reached New Orleans

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from Bluefields. She belongs to the Bluefields Fruit & Steamship Co., and was purchased recently in New York especially for the New Orleans-Nicaraguan trade. Her register was changed while she was at Bluefields loading for New Orleans. * * *

The Louisiana Steamboat Owners' Association has protested by wire to the Louisiana delegation in congress against the proposed law to provide for three crews on steam vessels, and known as the "three-crew bill." The protest recites that two engineers only are necessary to operate a steamboat, and that employment of a third engineer entails the expense of hiring a full extra crew to serve with that engineer. The steamboat owners added that their earnings have been cut to a minimum for other reasons, and that they cannot afford this extra expense. At the meeting which sent the telegram of protest, were P. D. Mitchell, L. V. Cooley, Henry Higby, W. A. Duke, Henry Carter, A. W. Whiteman, A. M. Halliday, M. P. Doullut, Roy Streckfus, M. F. Bradford, Joseph Bisso, G. H. White, C. W. Drown, and Ernest Lee Jahncke.

* * *

Ricardo Taya, Barcelona, Spain, has been elected president of the widely-known shipping firm of Jose Taya's Sons, Barcelona and New Orleans. Henry Plassan was named vice president and Fernando Freije, secretary. Mr. Taya will maintain the presidential offices in New Orleans.

* * *

The Lamb-Fish Lumber Co., Charleston, Miss., has gone into the barge business, all because it sold several hundred thousand railroad ties to the French government. To avoid railroad rates and to facilitate movement of these ties, the lumber company has opened a barge line from Greenwood, Miss., to New Orleans, where the French steamers will load them. The lumber company is trying the experiment of giving Greenwood and its vicinity an extremely low rate on return merchandise. If enough business results the barge line will be continued, after the ties have been cut and shipped.

* * *

Establishment of a regular line of sailing vessels between New Orleans and European ports has been undertaken by Alfred Clement & Co., freight brokers and forwarding agents of New Orleans, who have purchased the barkentines HILDEGAARD, which cleared for Havre in March; GENERAL E. S. GREELY, which sailed for Havre in April; LYMAN M. LAW and LUCINDA SUTTON, the latter two to take cargoes to England.

Around Puget Sound

By F. K. Haskell

THE Trans-Pacific Marine Co. was recently incorporated at Seattle, Wash., with a capital stock of $250,000, for the purpose of entering the ship building business on Puget Sound. Three vessels, each to cost $150,000 to $175,000, are to be built for the lumber trade. The trustees of the new company are J. H. Bloedel, J. A. Kerr, A. F. Anderson and J. W. Maxwell, Seattle, and J. J. Donovan, Bellingham, Wash.

* * *

The Westward Navigation Co.'s new motor ship KUSKOWIM RIVER, the first motor ship of any size to be built in Seattle, was launched late in April at the plant of Johnson Bros. & Blanchard. KUSKOWIM RIVER is being built especially for the Seattle-Kuskowim river trade. The vessel is 158 feet in length, 37 feet beam, and 16 feet deep. She will be equipped with twin diesel engines of 300 horsepower.

* * *

Forty-three steamers, with a net tonnage of 134,646, cleared from Puget sound during January, February and March for ports in the far east. The fleet included 32 Japanese, five American, four British and two Russian carriers.

* * *

The ship building industry on the Columbia river will shortly employ 3,000 men, giving a daily payroll of at least $10,000. The Willamette Iron & Steel Works will employ 300 men for building the auxiliary engines, boilers, etc., for the four steel steamers to be constructed by that company. The Northwest Steel Co., Portland, will have about 1,000 men engaged in constructing the three hulls for which it has secured contracts from Hannevig & Johnson, New York.

* * *

One of the most unique marine combinations ever turned out of a Puget sound port, and the first of the kind to navigate the waters of Alaska, left Tacoma during the month. The combination consists of the new tender SHAMROCK II and the floating store and saltery barge just built for the Northland Trading & Packing Co., Tacoma. SHAMROCK II was built by Johnson & Wogbo, builders. She is equipped with a 45-horsepower Fairbanks Morse semi-diesel engine. The floating store and saltery barge is of the two-deck type, 64 feet in length and 12 feet beam. The upper deck is fitted with quarters for the managers and crew. Below is a large galley and dining room. The galley includes a bake oven for baking from 300 to 400 loaves of bread daily. On one side is a large work table fitted with shelves and bins. The barge and tender are both equipped with electric lights. * * *

The largest wooden vessel on the Pacific coast and the largest single decker under the American flag, was recently launched at the St. Helens ship yards, being christened CITY OF PORTLAND. The vessel is the first of several auxiliary power schooners built for the Charles R. McCormick Lumber Co. She is 290 feet long and 44 feet beam. She will have five masts. Two engines of 320 horsepower each will drive her twin screws. Her lumber carrying capacity will be 2,000,000 feet.

* * *

Due, it is explained, to heavy increases in the cost of ship supplies, repairs and replacements, the Puget Sound Navigation Co. has increased passenger rates on the Seattle-Tacoma boats. The one-way rate is advanced from 35 to 40 cents and the round-trip rate from 50 to 60 cents. * * *

Commercial Point, near Bellingham, Wash., supposed to be an ancient burying ground for the Indians, has been converted into a ship yard by the Pacific American Fisheries Co. E. B. Deming, president, has announced that two ships are to be built for the fishing work in Alaska.

Baltimore and Chesapeake

By Hollis F. Bennett

SHIPPING circles at Baltimore are grieving over the loss of two of its oldest members. Patrick Dougherty, president of the P. Dougherty Co., tugboat and barge owners, died April 10, after a short illness. Mr. Dougherty was born in County Mayo, Ireland, and came to this country at the age of 17. He became interested in shipping at Baltimore, and in 1882, together with Thomas McHugh, he formed the P. Dougherty Co. He was probably the best known tugboat man south of New York and his loss will be keenly felt. Colin McLean, president of the McLean Contracting Co., died suddenly April 28. We was born in Scotland and came to this country as a young man. Mr. McLean's company built the foundations for the Brooklyn bridge and the Statue of Liberty, in New York. He has always been prominent in the development of this port and a few years ago bought up and filled in the north shore of Spring Gardens, the west branch of the Patapsco river. His judgment in foreseeing the development of this section of the port of Baltimore is becoming more apparent every day. Mr. McLean was a prominent member of the Baltimore Yacht Club.

* * *

Lieutenant Berg, prize master of the captured British steamship APPAM, interned at Newport News, Va., reports the vessel leaking badly. He reports that prior to APPAM'S capture by the German raider MOEWE, she was ashore at Dakar, South Africa, and was badly strained.

* * *

Captain Joseph Delano, veteran commander of the New York & Baltimore Transportation Co.'s steamship CHESAPEAKE, has just taken his first vacation in 33 years.

* * *

The new steamship ABOREAN, built by the Maryland Steel Co. for the American-Hawaiian Steamship Co., was turned over to her owner for the first of the month.

* * *

The schooner ELSIE A. BAYLIS stranded at the New Inlet coast guard station, N. C., recently and is reported to be a total loss. The master of the vessel, Captain Brown, is reported lost. BAYLIS was built in 1888 and was owned in Bangor, Me

* * *

The Pacific Coast Steamship Co.'s MONTANA is at the yards of the Newport News Shipbuilding & Drydock Co for overhauling and repairs. The job will cost approximately $25,000.

* * *

The Maryland Steel Co. launched the steamer MUNPLACE for the Munson Steamship Co. on April 10. MUNPLACE is 328 feet 6 inches long, 46 feet beam and 25 feet 6 inches depth of hold. She will carry approximately 5,000 tons.

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Equipment Used Afloat and Ashore

Robinson-Roders Silk-Floss Life Preserver—McGiff Lamps for Night Rescue Work

AN interesting and original type of life preserver has been developed by the Robinson-Roders Co., Newark, N. J. This preserver has been tested and approved by the United States steamboat inspection service. For some years previous to this action by the board of supervising inspectors, these preservers had been used extensively in the navy, in Canada and on motor boats. Fig. 1 shows the standard form of the Robinson-Roders life preserver. It is made up in the form of pillows which permit of its being neatly covered when not in use. The preserver is designed to hold the head out of the water, as shown in Fig. 2. This life preserver may be made up in numerous other forms,, including mattresses, cushions, etc. The preservers

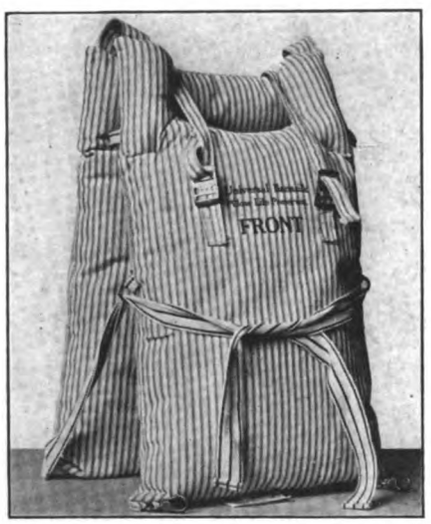

FIG. 1 — LIFE PRESERVER PILLOW MANUFACTURED BY ROBINSON-RODERS CO.

are filled with kapok, imported from the Orient. The use of this material for life preservers was developed by Lieutenant S. P. Edmonds, of the United States coast guard.

An exhaustive article by Frederick G. Coburn, naval constructor, United States navy, on the use of kapok for life-saving purposes at sea was published on pages 422-426 of the November, 1914, issue of *The Marine Review*. In this article Constructor Coburn stated that "kapok will support 20 times its own weight in water". "In leather or imitation leather cushions," he continued, "it will support this weight for three months. An ordinary mattress stuffed with kapok will support a passenger

FIG. 2—ROBINSON-RODERS LIFE PRESERVER IN USE

until rescued, if the passenger does not die of thirst and hunger; and as rescue comes pretty quickly in these modern times, kapok looks like a valuable adjunct to the seagoing ship's equipment".

It was largely through the efforts of Constructor Coburn that kapok, which is commonly known as silk floss, was introduced into the navy, and it is stated that up to date the navy department has purchased over 300,000 pounds of this material for use in making life preservers, pillows, mattresses, etc.

Luminous Life Preservers

The seaman's act, which is now in force, requires every steamship to be equipped with a certain number of luminous ring buoys, depending on the overall length of the vessel. The large 600-foot bulk freighters on the Great Lakes must have 12 such buoys. In order to meet the demand for equipment of this character, a luminous life-saving apparatus has been developed by A. M. McGiff, New York City. The accompanying illustrations show how Mr. McGiff's appliances may be adapted to ring buoys or to regular life preservers. Fig. 1 shows two lights attached to an ordinary ring buoy and Fig. 2 shows how the lamps may be used in connection with a standard life preserver. For ring buoys the tubular form of flash light is preferred, the electrical energy being obtained from the dry battery. For ordinary life preservers, the flat type of flash light is preferred. In any case the flash light is enclosed in a waterproof bag which prevents damage to the battery and electrical connections.

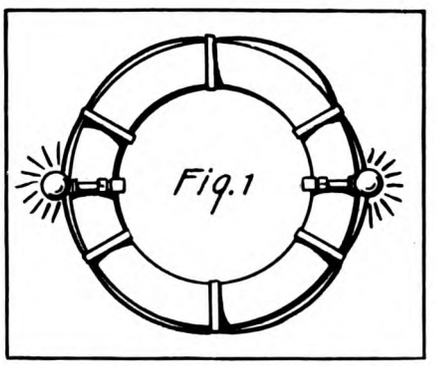

FIG. 1—McGIFF BATTERY LAMPS FITTED TO RING BUOY

These appliances are expected to be of particular service in effecting rescues at night, inasmuch as the lights will burn for several hours, giving rescue parties plenty of time to locate the victims of accident. In the case of the TITANIC a great many lives were lost owing to the impossibility of locating people in the water at night.

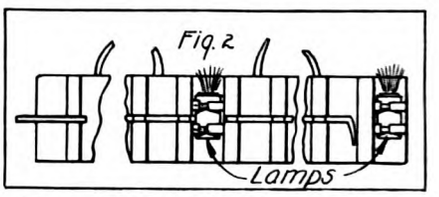

FIG. 2—LUMINOUS LIFE PRESERVER

May Build Steel Ships

The increase in the capitalization of the Nova Scotia Steel & Coal Co., New Glasgow, N. S., recently authorized is believed to mean the entrance of the company into the steel ship building industry. Col. Thomas Cantley, president of the company, sees in the present shortage of ocean tonnage an excellent opportunity to increase the earnings of this company, and at the same time there may be a certain amount of pride in his effort to revive the ship building industry of his native province, only in this case the output will be steel steamers in place of the old wooden sailing ships which were once turned out by the hundreds from the ship yards of Nova Scotia.

The Pacific Coast Steamship Co. has compiled percentage figures showing an increase of 29 per cent in the number of coastwise passengers carried in 1915 as compared with the number carried in 1914.

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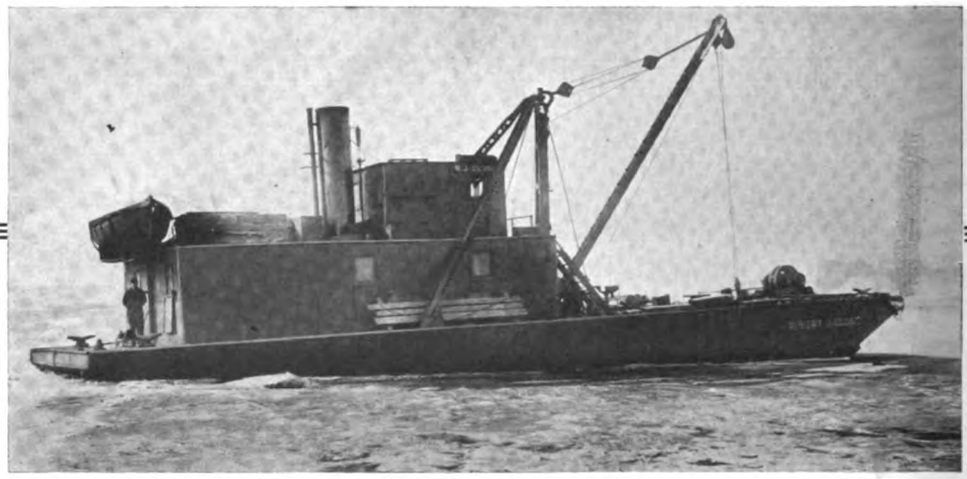

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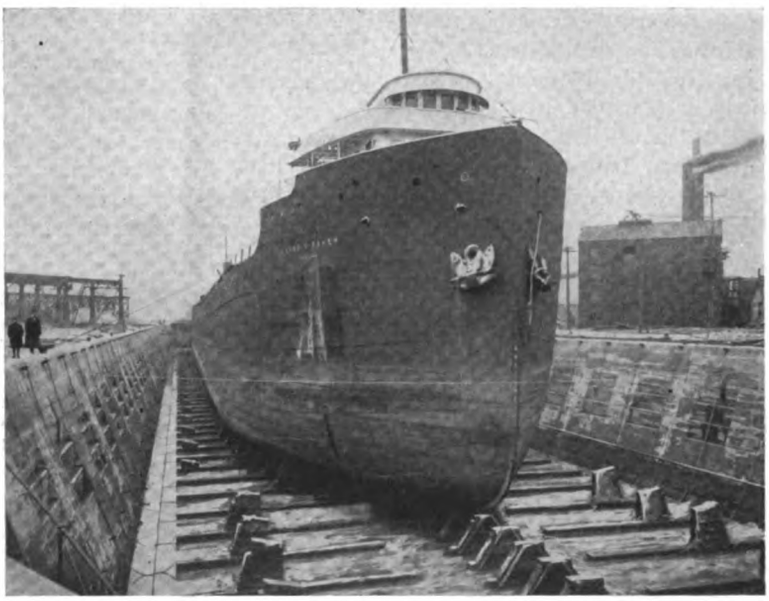

Steamer George F. Baker in Our New Concrete Dock at South Chicago

Dimensions of Dry Dock

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Length -	734
Width:	
At Top -	103
At Bottom -	88
Depth -	22½

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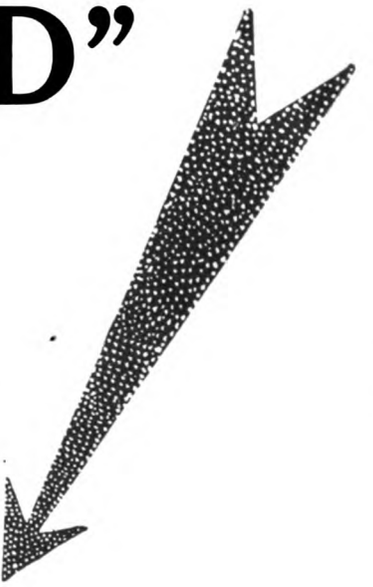
OF

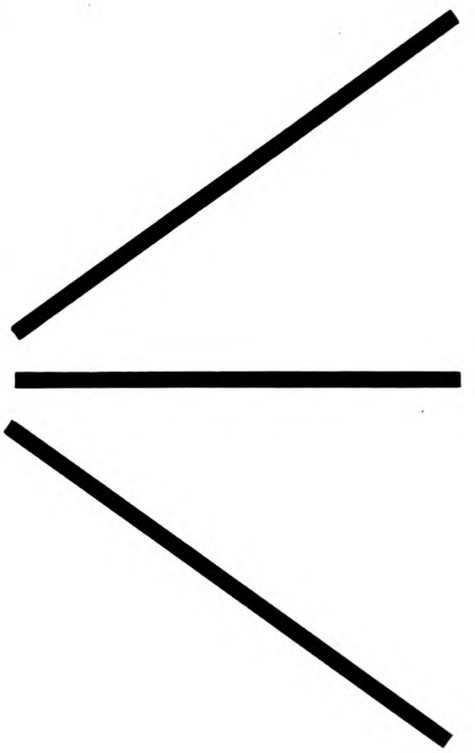
SHIP BUILDING



Experience has proved that this system gives increased strength, increased cubic and deadweight capacity, reduced cost of maintenance, and reduced vibration at no greater first cost than a vessel of similar dimensions built on the transverse system.

Owners who are contemplating the construction of new vessels, of any type whatever, will find this system of construction most advantageous and suitable for all trades.

493 vessels of all types and sizes, representing about 3,792,450 tons deadweight carrying capacity (up to the beginning of March) have been built or are now on order, including a good many repeat orders from Owners who have tried the system.



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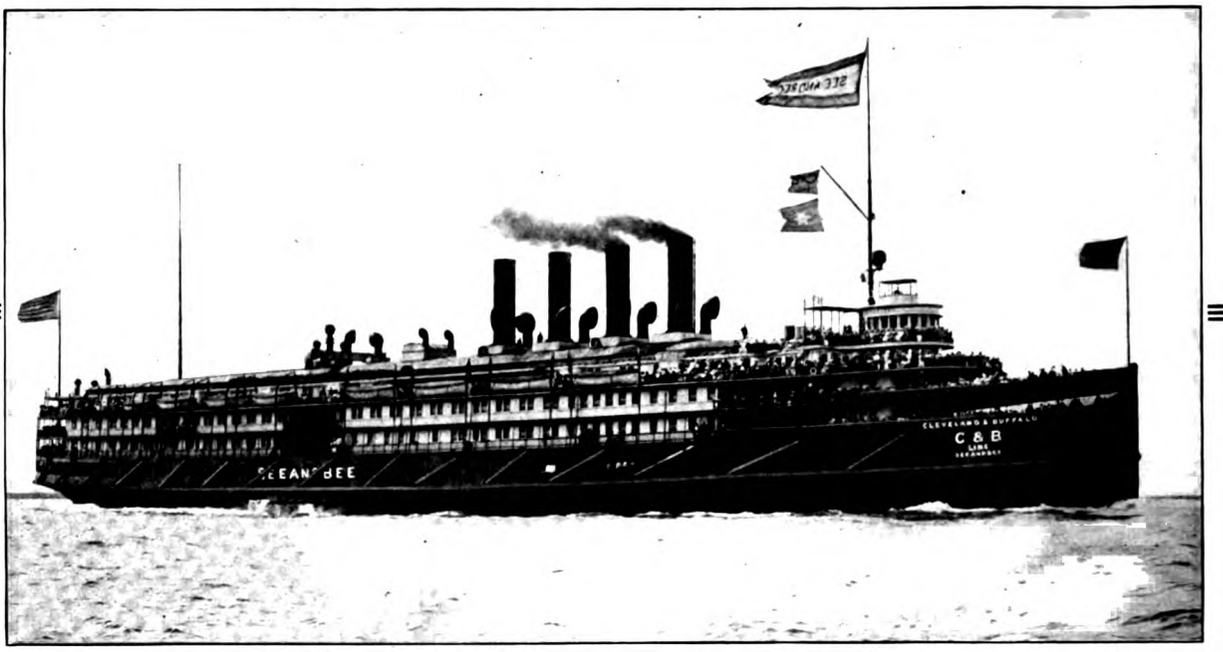

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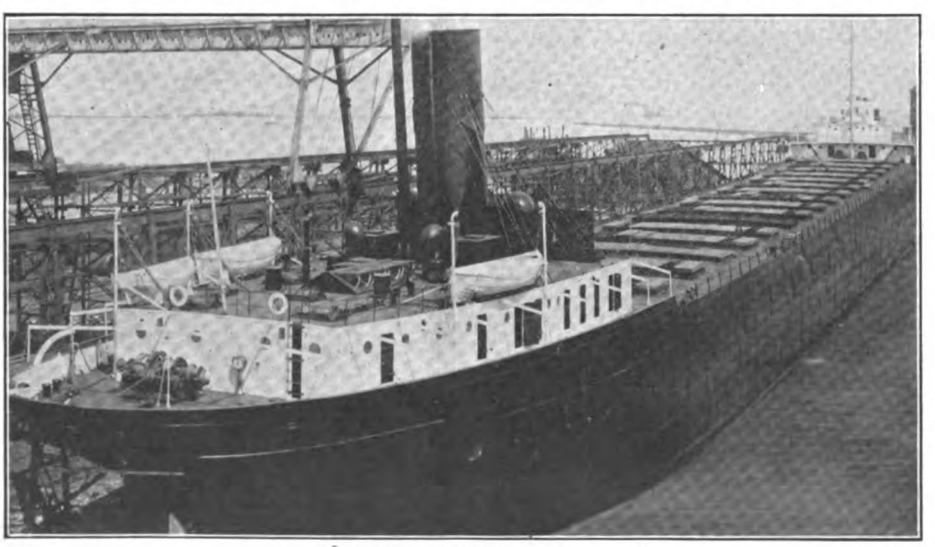

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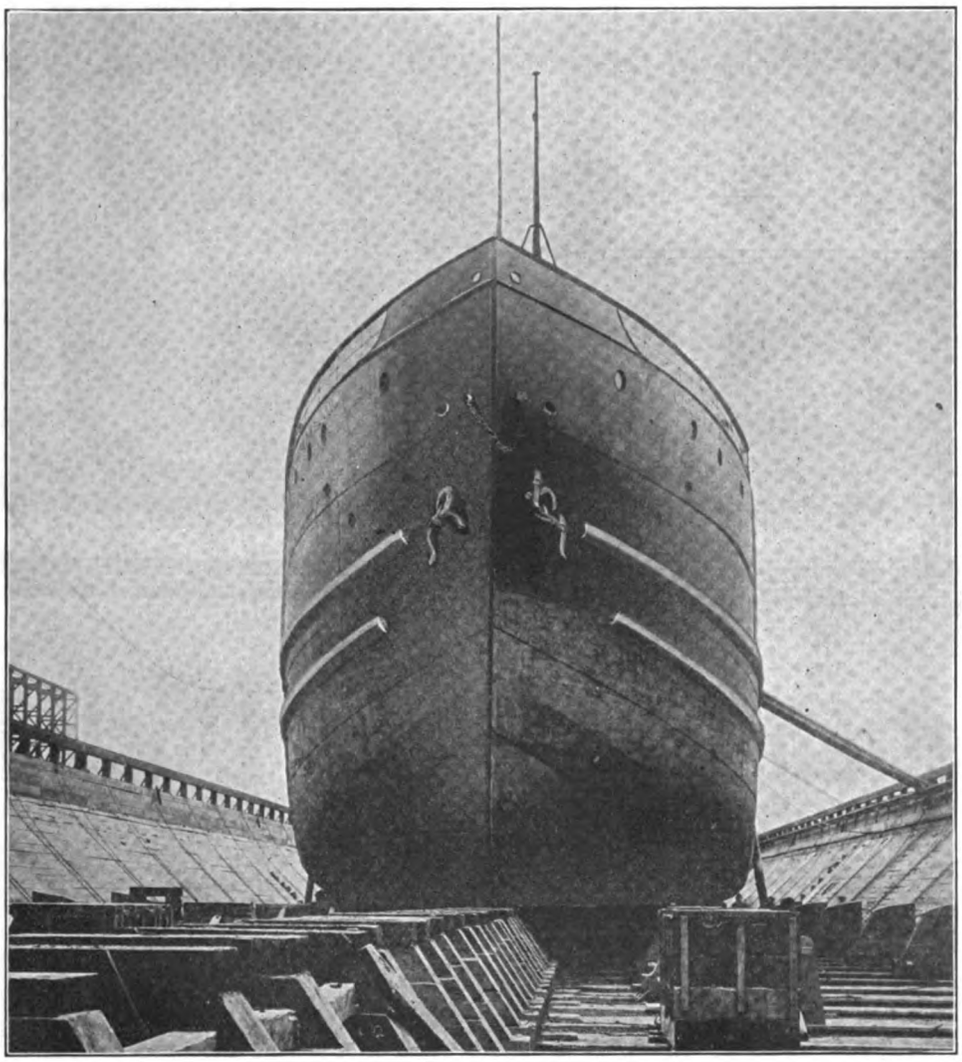
THE TOLEDO SHIPBUILDING COMPANY



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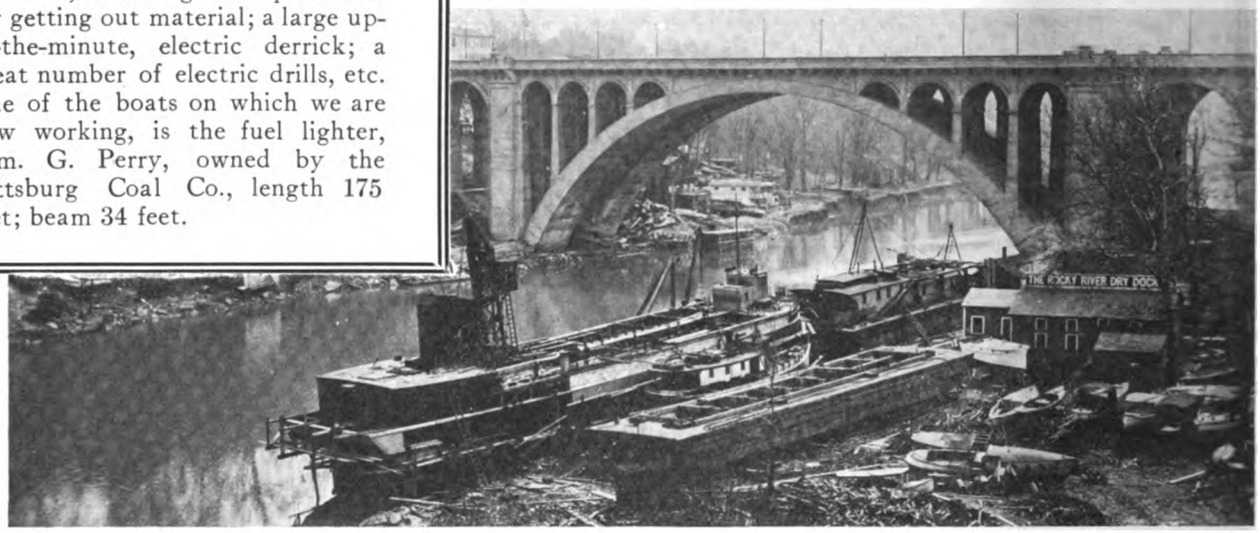

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HOBOKEN, N. J.

NINE DRY DOCKS

General Repairs on Wooden and Iron Vessels

FT. OF 17th STREET

Telephone 700 Hoboken **HOBOKEN, N. J.**

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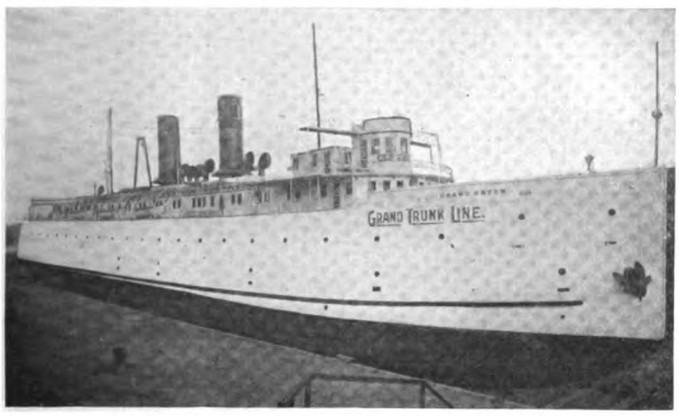
Milwaukee Dry Dock Company

Milwaukee, Wisconsin

Ship Repairs of All Kinds

Also Machine Shop for Engine Repairs



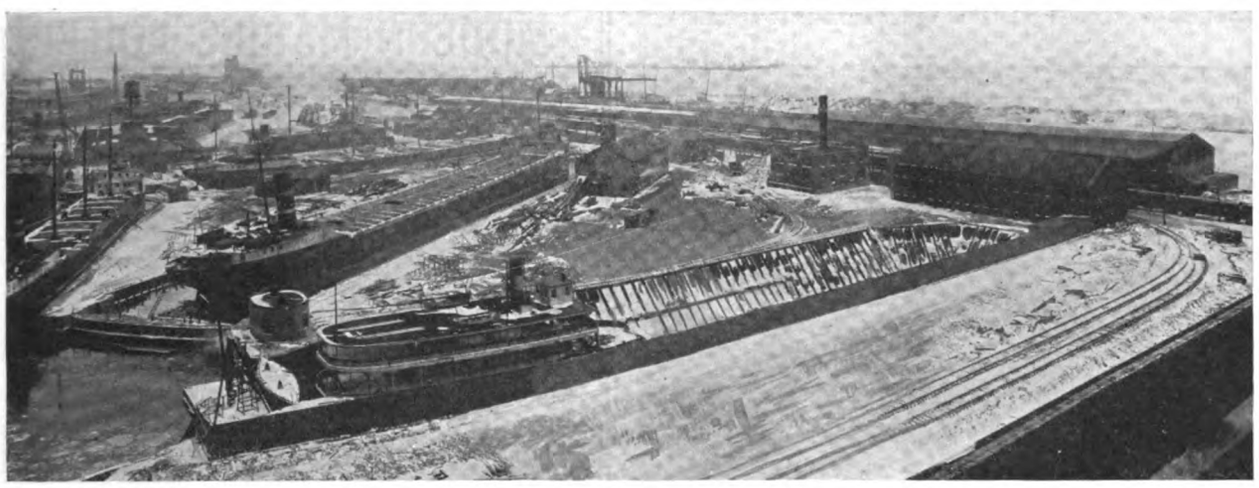
Car Ferry "Grand Haven" in Dry Dock

We have two ship yards offering every facility for the repair of both steel and wooden vessels. South Yard Dock is 450 feet long on keel blocks; 460 feet over all; 60 feet width of gate and 16 feet over sill. West Yard Dock is 312 feet on keel blocks; 45 feet width of gate and 12 feet over sill. Rudder pit in each dock. Electric light for night work.

Residence Phone
F. W. Smith, Manager
Lake 467

Main Office at South Yard
Foot of Washington Street

Telephone—Hanover 3
West Yard—Hanover 2555



The Buffalo Dry Dock Company

BUFFALO, N. Y.

With our excellent equipment we are enabled to do all kinds of ship repairs at reasonable cost to the owners, whose patronage is solicited with the guarantee of satisfaction in all particulars.

EDWARD N. SMITH, Superintendent **WILLIAM KNIGHT, Ass't Sec'y and Treas.**

Office Telephone, Bell, 4055 Seneca: Federal, 22-531

Superintendent's Telephone, Tupper 3012 **Ass't Sec'y's Telephone, 324 North**

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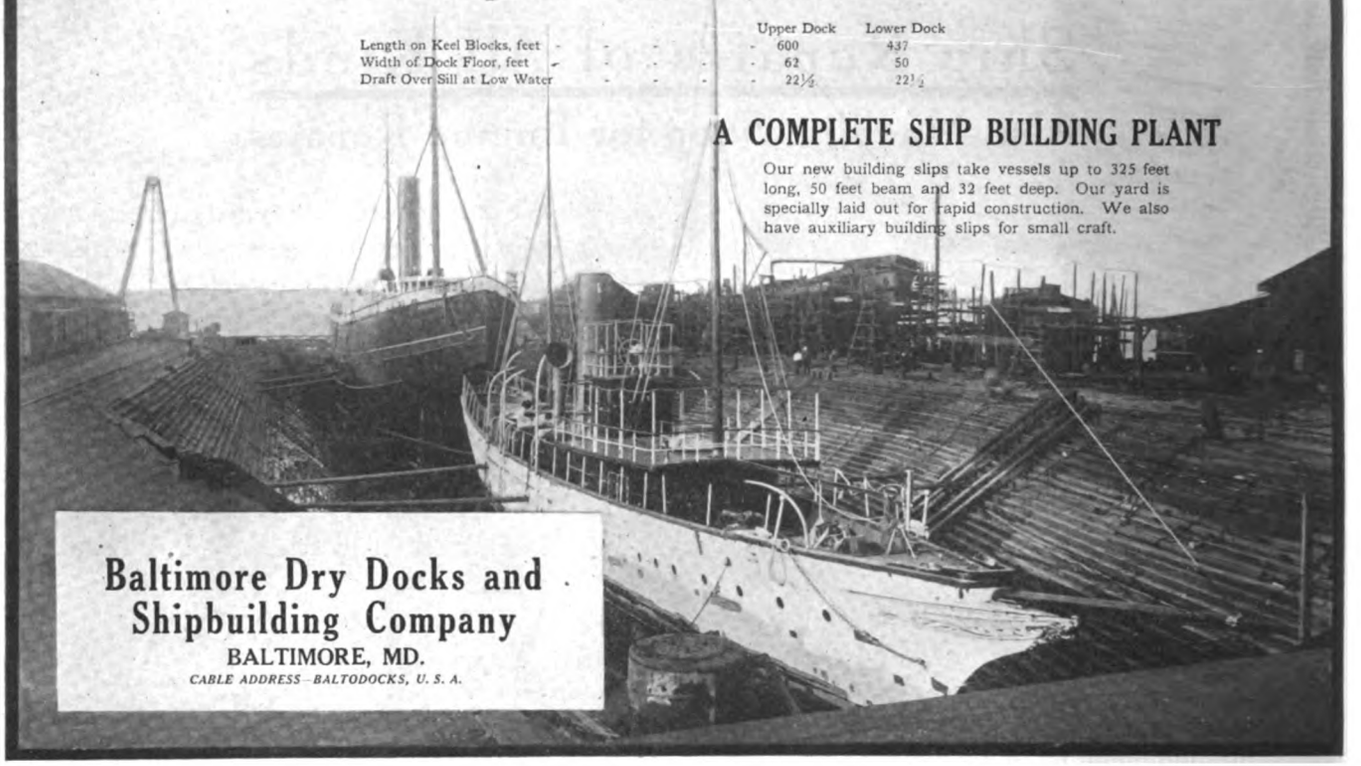
OUR DRY DOCKS SAVE TIME

Two Docks, coupled with Complete Shop Facilities, cut repair periods to a minimum

	Upper Dock	Lower Dock
Length on Keel Blocks, feet	600	437
Width of Dock Floor, feet	62	50
Draft Over Sill at Low Water	22½	22½

A COMPLETE SHIP BUILDING PLANT

Our new building slips take vessels up to 325 feet long, 50 feet beam and 32 feet deep. Our yard is specially laid out for rapid construction. We also have auxiliary building slips for small craft.



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BALTIMORE, MD.
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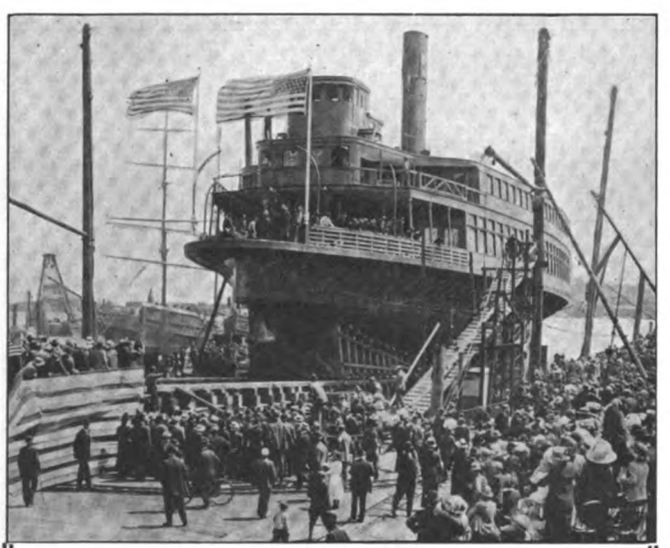

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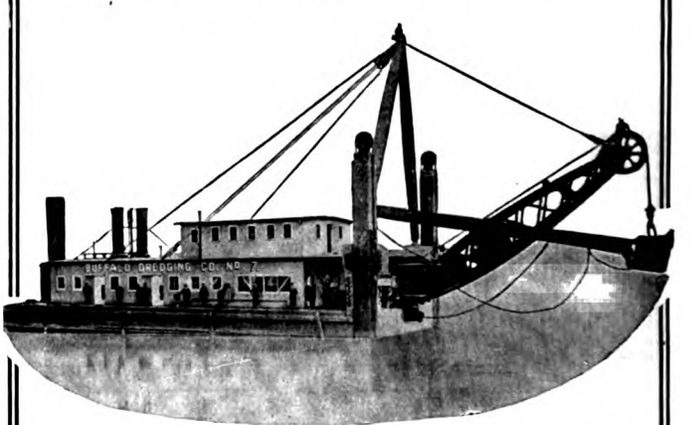

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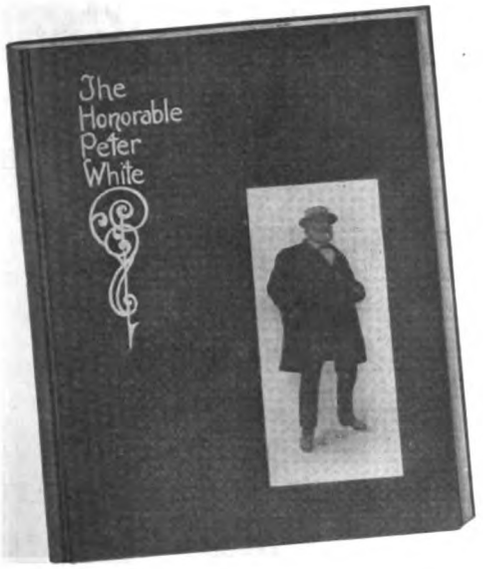

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for both

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regarding

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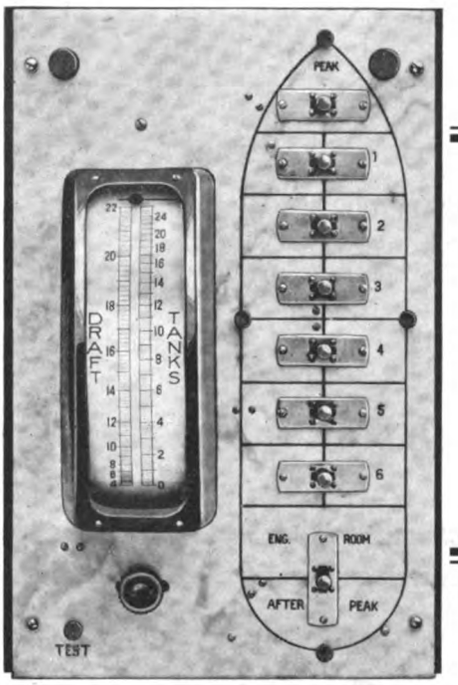

Operates without Rheostat or Contact Buttons.

By simply pressing the button which corresponds to the tank you wish to sound, the pointer will immediately indicate in feet and inches the depth of water in that particular compartment. All compartments can be sounded in less than a minute regardless of weather conditions.

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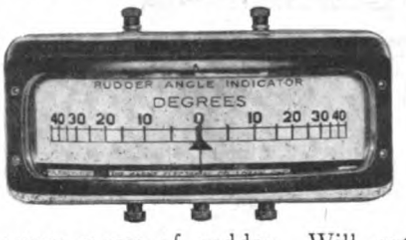

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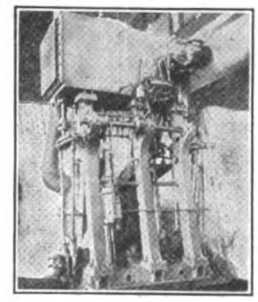

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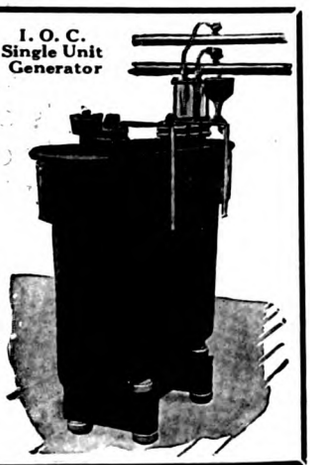

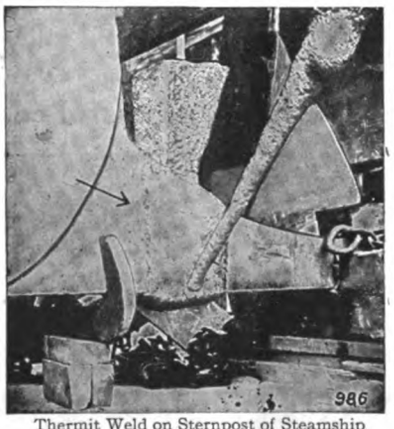

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There is nothing experimental about Thermit Welding. During the last few years we have executed many repairs for the principal steamship companies of the Atlantic and Pacific coasts and the Great Lakes and every repair has been uniformly successful and our best advertisement.

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If you are interested obtain our pamphlet No. 3440 and Reactions, which illustrate and describe many marine repairs and contain full information about the process. Every marine man should have one

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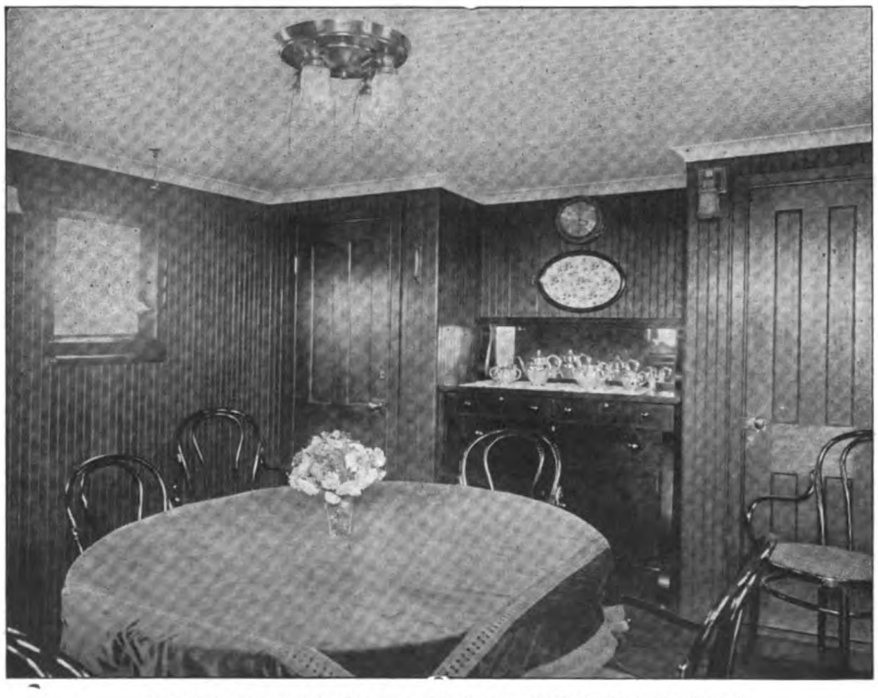

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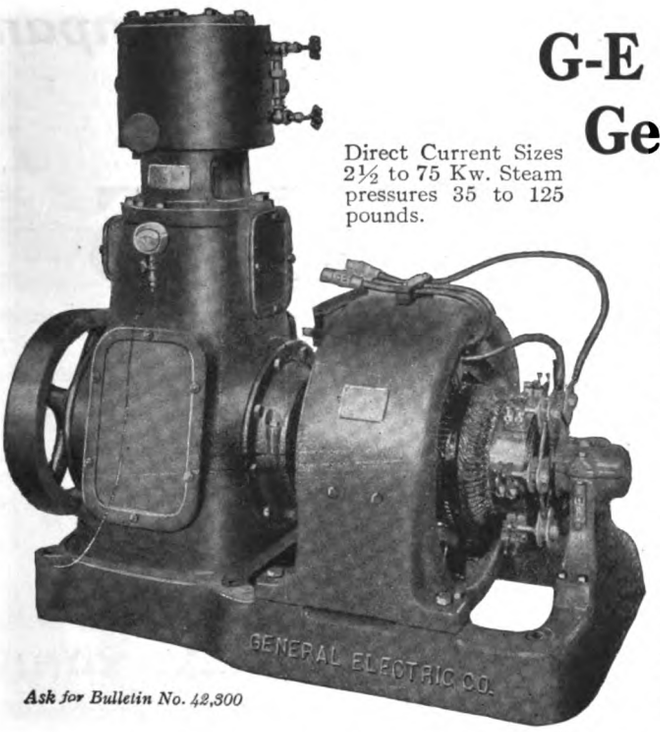

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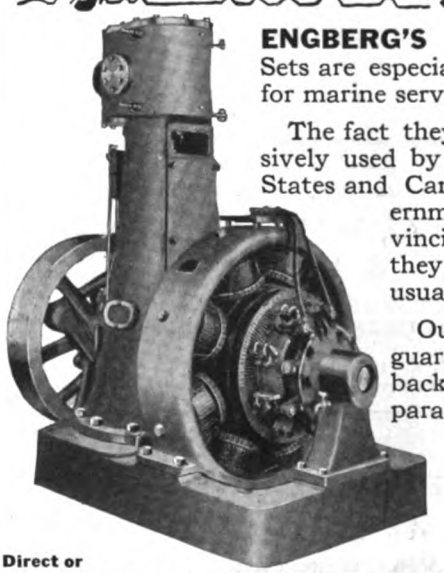

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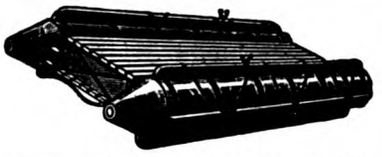

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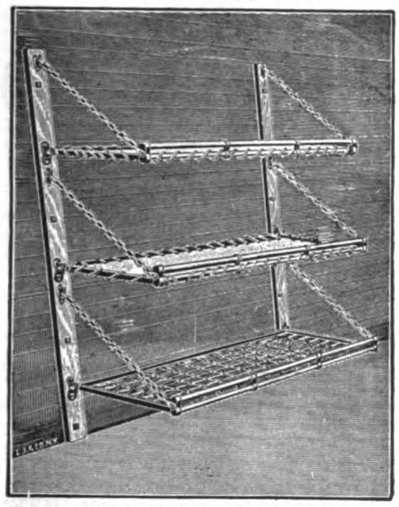

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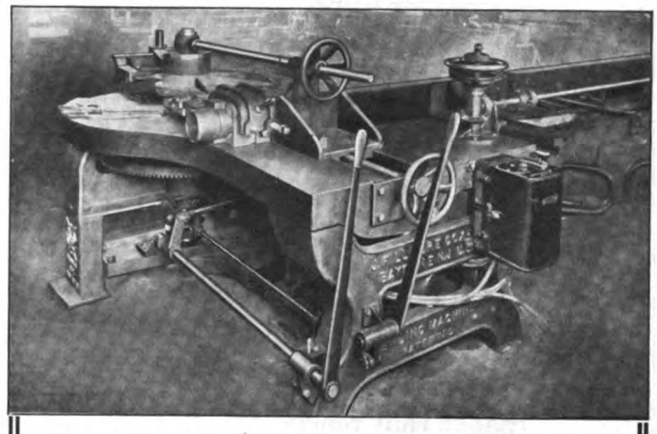

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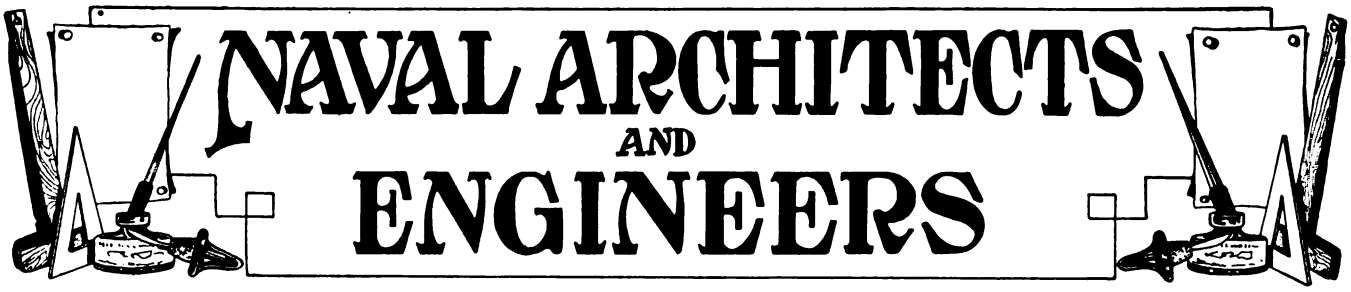

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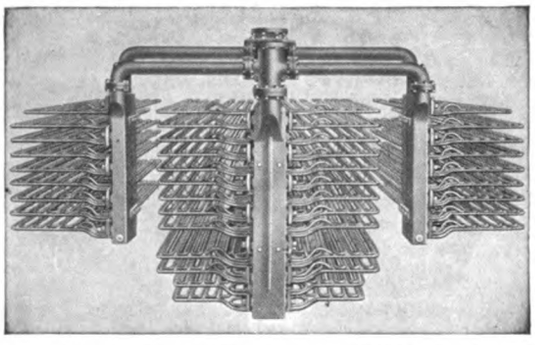

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Trout, H. G., Co., Buffalo, N. Y.

ENGINES.
(Mooring.)
American Engineering Co., Philadelphia, Pa.
Chase Machine Co., Cleveland, O.

ENGINES.
(Oil.)
Bolinders Co., New York City, N. Y.

ENGINES.
(Steering.)
American Engineering Co., Philadelphia, Pa.
Hyde Windlass Co., Bath, Me.

ENGINE STOPPING DEVICES.
Mulholland Hatch-Fastener Co., Cleveland, O.

FASTENERS.
(Hatch.)
Mulholland Hatch-Fastener Co., Cleveland, O.

FILTERS.
(Feed Water.)
Griscom-Russell, The, Co., New York City.
Ross Valve Mfg. Co., Troy, N. Y.

FIRE ESCAPES.
McArthur Portable Fire Escape Co., Cleveland

FIRE ALARM SYSTEMS.
Cory, Chas., & Sons, New York, N. Y.

FIRE DEPARTMENT SUPPLIES.
Morse, A. J., & Son, Boston, Mass.

FIXTURES.
General Electric Co., Schenectady, N. Y.

FLOORING.
(Composition.)
Byerley & Sons, Cleveland, O.

FLOORING.
(Warehouse.)
Byerley & Sons, Cleveland, O.

FORGINGS.
Collingwood Ship Bldg. Co., Collingwood, Ont., Can.

FORGINGS.
(Steel.)
Fore River Ship Bldg. Corp., Quincy, Mass.

FOUNDERS.
Chase Machine Co., Cleveland, O.
Kingsford Fdy. & Mach. Co., Oswego, N. Y.
Seattle Const. & Dry Dock Co., Seattle, Wash.

FUELING COMPANIES AND COAL DEALERS.
Hall, Geo., Coal Co., Ogdensburg, N. Y.
Hanna, M. A., & Co., Cleveland, O.
Lorain Coal & Dock Co., Columbus, O.
Pickands, Mather & Co., Cleveland, O.

FURNACES.
(Boilers.)
Continental Iron Works, The, Borough of Brooklyn, N. Y.

FURNACE BRIDGE WALL.
Wager, Robert H., New York City, N. Y.

FURNACE FRONTS AND DOORS.
(Land and Marine.)
Continental Iron Works, The, Borough of Brooklyn, N. Y.

GAGES.
(Steam.)
Ashton Valve Co., Boston, Mass.

GAGES.
(Water.)
Penberthy Injector Co., Detroit, Mich.

GEARS.
(Marine Reduction.)
Hunt, Mirk & Co., San Francisco, Cal.
Hunt, Mirk & Co., Seattle, Wash.
Westinghouse Mch. Co., Pittsburgh, Pa.

GENERATORS.
Engberg's Electric & Mechanical Works, St. Joseph, Mich.
General Electric Co., Schenectady, N. Y.
International Oxygen Co., New York, N. Y.

GRAIN TRIMMERS.
Co-Operative Grain Trimmers, Fort William, Ont., Can.

GRAPHITE.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

GRAPHITE.
(Boiler Lubricating, Greases.)
Dixon, Joseph, Crucible Co., Jersey City, N. J.

GRATE BARS.
Trout, H. G., Co., Buffalo, N. Y.

GREASES.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

GYPSEYS.
(Steam.)
American Engrg. Co., Philadelphia, Pa.

HAMMERS.
(Steam.)
Chase Machine Co., Cleveland, O.

HATCH FASTENERS.
Mulholland Hatch-Fastener Co., Cleveland, O.

HEATERS AND PURIFIERS.
(Feed Water.)
Ross Valve Mfg. Co., Troy, N. Y.

HOISTS.
(Air.)
American Ship Building Co., Cleveland, O.

HOISTS.
(Anchor.)
Superior Iron Works, Superior, Wis.

HOISTS.
(Cargo, Etc.)
American Engineering Co., Philadelphia, Pa.
Boston & Lockport Block Co., East Boston, Mass.
Chase Machine Co., Cleveland, O.
Dake Engine Co., Grand Haven, Mich.
General Electric Co., Schenectady, N. Y.

HOISTS.
(Chain.)
Dake Engine Co., Grand Haven, Mich.

HOISTS.
(Electric.)
American Engineering Co., Philadelphia, Pa.
General Electric Co., Schenectady, N. Y.

HOISTS.
(Pneumatic.)
Dake Engine Co., Grand Haven, Mich.

HOSE.
Schrader's, A., Son, Inc., Brooklyn, N. Y.

HOTELS.
Hotel Tuller, Detroit, Mich.

HYDROGEN GENERATORS.
International Oxygen Co., New York, N. Y.

ICE MACHINES.
Clothel Co., The, New York City, N. Y.
Roelker, H. B., New York City, N. Y.

INDICATORS.
Cummings Ship Instrument Wks., Boston.
Electro-Dynamic Co., Bayonne, N. J.
McNab Co., Bridgeport, Conn.

INDICATORS.
(Direction.)
Cummings Ship Instrument Works, Boston.
Electro-Dynamic Co., Bayonne, N. J.
McNab Co., Bridgeport, Conn.

INDICATORS.
(Recording.)
McNab Co., Bridgeport, Conn.

INDICATORS.
(Speed.)
Cummings Ship Instrument Works, Boston.
McNab Co., Bridgeport, Conn.

INJECTORS.
Penberthy Injector Co., Detroit, Mich.

INSURANCE.
(Marine.)
Boland & Cornelius, Buffalo, N. Y.
Hutchinson & Co., Cleveland, O.
Richardson, W. C., & Co., Cleveland, O.
Vance & Joys, Milwaukee, Wis.

IRON ORE.
Hanna, M. A., & Co., Cleveland, O.
Pickands, Mather & Co., Cleveland, O.

LADDERS.
(Portable.)
McArthur Portable Fire Escape Co., Cleveland

LAMPS.
(Mazda and Arc.)
General Electric Co., Schenectady, N. Y.

LANTERNS.
(Buoy.)
Safety Car Heating & Lighting Co., New York

LAUNCHES.
Drein, Thomas, & Son, Wilmington, Del.

LIFE BOATS.
Detroit Ship Bldg. Co., Detroit, Mich.
Drein, Thomas, & Son, Wilmington, Del.
Kahnweiler's, David, Sons, New York, N. Y.
Lane, C. M., Life Boat Co., Brooklyn, N. Y.
Welin Marine Equipment Co., Long Island City, N. Y.

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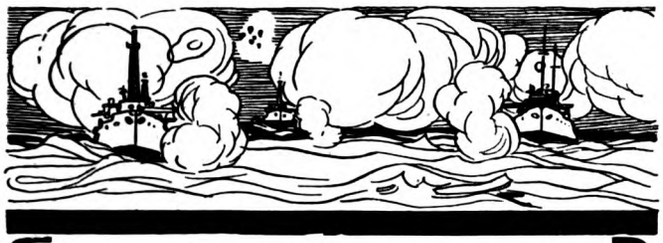

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Moreover, the same superior characteristics have been proved in the Merchant Marine.

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All essential parts of Babcock & Wilcox Boilers are heavier than the corresponding parts in Scotch boilers, thus giving greater security against corrosion.

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A large portion of our business consists of "repeat-orders." You know what that means. ***Write us at once.***

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NEW YORK and LONDON

Just send a postal for this booklet

Let Dixon's Flake Boiler Graphite remove scale for you. The explanation of its gentle, mechanical action is fully given in this booklet, sent free upon request. Do not delay writing for a copy (No. 77T)—become acquainted with DIXON'S—"the pioneer boiler graphite."

Made in Jersey City, N. J., by the

Joseph Dixon Crucible Company

D X N TRADE MARK **Established 1827** D X N TRADE MARK

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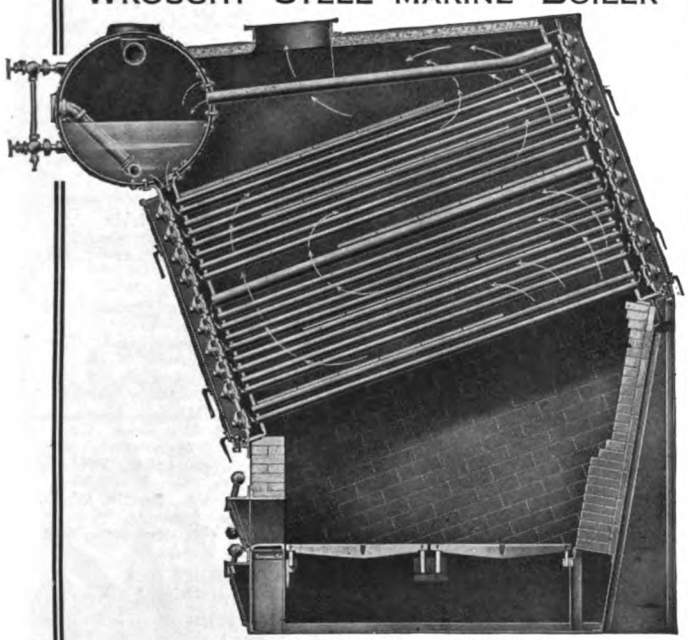

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NO STEAMER COMPLETE WITHOUT IT.

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The only control adopted by **all** Transatlantic and other Lines, large number of installations on order and installed in this country.

An automatic fog signal assured, and a **dry, clear, crisp, penetrating** blast guaranteed.

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Connect it up by a pipe and install it on your steam gauge board, do away with your constant clattering rods and small gear; it is a "revolution in counters."

The McNab "Cascade" Boiler Circulator and Fuel Economizer

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or

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D. E. FORD, 465 California St., San Francisco, Cal.
M. M. DRAKE, 17 Battery Place, N. Y. City.

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Drein, Thos., & Son, Wilmington, Del.
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LIFE BOAT RELEASING DEVICE.
Lane, C. M., Life Boat Co., Brooklyn, N. Y.
Mulholland Hatch Fastener Co., Cleveland, O.

LIFE BOAT SYSTEM.
Lane, C. M., Life Boat Co., Brooklyn, N. Y.
Welin Marine Equipment Co.,
Long Island City, N. Y.

LIFE PRESERVERS.
Brauer, Justus, & Son, Inc., Philadelphia, Pa.
Kahnweiler's, David, Sons, New York City.
Lane, C. M., Life Boat Co., Brooklyn, N. Y.

LIFE PRESERVERS.
(Luminous.)
McGiff & James, New York City, N. Y.

LIFE SAVING EQUIPMENT.
Brauer, Justus, & Son, Inc., Philadelphia, Pa.
Drein, Thos., & Son, Wilmington, Del.
Kahnweiler's, David, Sons, New York City.
Lane, C. M., Life Boat Co., Brooklyn, N. Y.
Welin Marine Equipment Co.,
Long Island City, N. Y.

LIGHTS.
Safety Car Heating & Lighting Co.,
New York City.

LIGHTS.
(Electric.)
Cory, Chas., & Son, New York City, N. Y.
General Electric Co., Schenectady, N. Y.

LOGS.
(Patent.)
Cummings Ship Instrument Works, Boston.

LOGS.
(Ship.)
Nicholson Ship Log Co., Cleveland, O.
Walker, Thomas & Son, Birmingham, Eng.

LUBRICANTS.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

LUBRICATING GRAPHITE.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

LUBRICATORS.
Penberthy Injector Co., Detroit, Mich.

LUMINOUS LIFE PRESERVERS.
McGiff & James, New York City, N. Y.

MACHINERY.
Kingsford Fdy. & Machine Co., Oswego, N. Y.

MACHINERY.
(Marine.)
American Ship Building Co., Cleveland, O.
Chase Machine Co., Cleveland, O.
Chicago Ship Building Co., South Chicago, Ill.
Collingwood Ship Building Co.,
Collingwood, Ont., Can.
Dake Engine Co., Grand Haven, Mich.
Detroit Ship Building Co., Detroit, Mich.
Fletcher, W. & A., Co., Hoboken, N. J.
Fore River Ship Building Corp., Quincy, Mass.
Johnston Bros., Ferrysburg, Mich.
Manitowoc Ship Bldg. & Dry Dock Co.,
Manitowoc, Wis.
Superior Iron Works, Superior, Wis.
Superior Ship Building Co., Superior, Wis.
Toledo Ship Building Co., Toledo, O.

MACHINISTS.
Chase Machine Co., Cleveland, O.
Seattle Construction & Dry Dock Co.,
Seattle, Wash.
Superior Iron Works, Superior, Wis.

MARINE RAILWAY.
Rocky River Dry Dock Co., Rocky River, O.

MARINE REDUCTION GEARS.
Westinghouse Machine Co., Pittsburgh, Pa.
Hunt, Mirk & Co., San Francisco, Cal.
Hunt, Mirk & Co., Seattle, Wash.

MARLINE.
Waterbury Co., New York, N. Y.

MARLINE COVERED WIRE ROPE.
Waterbury Co., New York, N. Y.

MECHANICAL WORKS.
Engberg's Elec. & Mech. Works,
St. Joseph, Mich.

MERCANTILE MARINE ASSOCIATION.
Canadian Mercantile Marine Assn.,
London, Ont., Can.

METAL POLISH.
Hoffman, Geo. Wm., Co., Indianapolis, Ind.

METALLIC PACKING.
U. S. Metallic Packing, The, Co., Philadelphia

METERS.
(Torsion.)
Cummings Ship Instrument Works, Boston.

MOORING LINES.
Durable Wire Rope Co., Boston, Mass.

MOTORS.
(Electric.)
Electro-Dynamic Co., Bayonne, N. J.
General Electric Co., Schenectady, N. Y.

MOTORS.
(Winch.)
General Electric Co., Schenectady, N. Y.

MUSIC WIRE.
Waterbury Co., New York, N. Y.

NAUTICAL INSTRUMENTS.
Ritchie, E. S., & Sons, Brookline, Mass.

NOZZLES.
Morse, A. J., & Sons, Boston, Mass.

OAKUM.
Stratford, Geo., Oakum Co., Jersey City, N. J.

OILS AND LUBRICANTS.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

OIL.
(Linseed.)
Patterson-Sargent Co., Cleveland, O.

OXYGEN AND HYDROGEN CYLINDERS AND CYLINDER STUD VALVES.
International Oxygen Co., New York City.

OXYGEN TESTING APPARATUS, WELDING AND CUTTING APPARATUS.
International Oxygen Co., New York City.

OXYGEN GENERATORS.
International Oxygen Co., New York City.

PACKING.
Carey, The, Co., Cleveland, O.
Home Rubber Co., Trenton, N. J.

PACKING.
(Metallic.)
U. S. Metallic Packing, The, Co., Philadelphia

PAINT.
(Copper and Iron.)
Patterson-Sargent Co., Cleveland, O.

PAINT.
(Graphite.)
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Patterson-Sargent Co., Cleveland, O.

PAINT.
(Hull.)
Patterson-Sargent Co., Cleveland, O.

PAINT.
(Marine.)
Patterson-Sargent Co., Cleveland, O.

PATENTS.
Siggers & Siggers, Washington, D. C.

PIG IRON.
Hanna, M. A., & Co., Cleveland, O.
Pickands, Mather & Co., Cleveland, O.

PIPE.
(Welded Steel.)
Continental Iron Works, The,
Borough of Brooklyn, N. Y.

PIPE BENDING MACHINES.
Cox, J. Fillmore, Engrg. & Tube
Bending Machine Works, Bayonne, N. J.

PLUMBAGO.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

PNEUMERCATORS.
Pneumercator, The, Co., New York City.

POLISH.
(Metal.)
Hoffman, Geo. Wm., Co., Indianapolis, Ind.

POWER PLANTS.
General Electric Co., Schenectady, N. Y.

PROJECTORS.
(Electric.)
General Electric Co., Schenectady, N. Y.

PROPELLER BLADES.
Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLER WHEELS.
American Ship Building Co., Cleveland, O.
Case, A. Wells, & Son, Highland Park, Conn.
Detroit Ship Building Co., Detroit, Mich.
Fore River Ship Building Corp., Quincy, Mass.
Hyde Windlass Co., Bath, Me.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Roelker, H. B., New York City, N. Y.
Sheriffs Mfg. Co., Milwaukee, Wis.
Superior Ship Bldg. Co., Superior, Wis.
Toledo Ship Building Co., Toledo, O.
Trout, H. G., Co., Buffalo, N. Y.

PROVISIONS.
(Ship.)
Duluth Marine Supply Co., Duluth, Minn.
Erdman, Joseph, Detroit, Mich.
Schroeder Bros. Co., Two Rivers, Wis.

PUMPS.
Boston & Lockport Block Co., E. Boston, Mass.

PUMPS AND APPLIANCES.
(Air.)
Kingsford Fdy. & Mch. Co., Oswego, N. Y.

PUMPS.
(Bilge.)
Blackmer Rotary Pump Co., Petoskey, Mich.

PUMPS.
(Miscellaneous Use.)
Blackmer Rotary Pump Co., Petoskey, Mich.
Kingsford Fdy. & Mch. Co., Oswego, N. Y.
Roelker, H. B., New York City, N. Y.

REFRIGERATING MACHINERY.
Clother, The, Co., New York City, N. Y.
Roelker, H. B., New York City, N. Y.

REGISTERING INSTRUMENTS.
(Draft.)
Pneumercator, The, Co., New York City.

REGULATORS.
(Pressure.)
Ross Valve Mfg. Co., Troy, N. Y.

RELEASING DEVICE.
(Life Boat.)
Mulholland Hatch-Fastener Co., Cleveland, O.

REPAIRS.
(Boiler.)
Commercial Boiler Wks., The, Seattle, Wash.

REPAIRS.
(Marine.)
American Ship Building Co., Cleveland, O.
Baltimore Dry Dock & Ship Bldg. Co.,
Baltimore, Md.
Buffalo Dry Dock Co., Buffalo, N. Y.
Chicago Ship Building Co., So. Chicago, Ill.
Collingwood Ship Bldg. Co.,
Collingwood, Ont., Can.
Delaney, P., & Co., Newburgh, N. Y.
Detroit Ship Building Co., Detroit, Mich.
Fore River Ship Bldg. Corp., Quincy, Mass.
Goldschmidt Thermit Co., New York City.
Johnston Bros., Ferrysburg, Mich.
Manitowoc Ship Bldg. & Dry Dock Co.,
Manitowoc, Wis.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Rocky River Dry Dock Co., Rocky River, O.
St. Lawrence Marine Ry. Co.,
Ogdensburg, N. Y.
Seattle Construction & Dry Dock Co.,
Seattle, Wash.
Superior Ship Bldg. Co., Superior, Wis.
Tietjen & Lang Dry Dock Co., Hoboken, N. J.
Toledo Ship Bldg. Co., Toledo, O.

REVOLUTION COUNTERS.
Cummings Ship Instrument Works, Boston.

ROPE.
Durable Wire Rope Co., Boston, Mass.

ROPE.
(Wire, Manilla and Fibreclad.)
Waterbury Co., New York City, N. Y.

ROPE AND FITTINGS.
Durable Wire Rope Co., Boston, Mass.

ROPE DRESSING.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

ROPE DRIVES.
Waterbury Co., New York City, N. Y.

SEARCHLIGHTS.
Engberg's Electric & Mechanical Wks.,
St. Joseph, Mich.
General Electric Co., Schenectady, N. Y.

SHEAVES.
Boston & Lockport Block Co.,
East Boston, Mass.

SHEAVE LUBRICATING DEVICE.
Mulholland Hatch Fastener Co., Cleveland, O.

SHEET IRON WORKS.
Commercial Boiler Works, The, Seattle, Wash.

SHIP BUILDING SYSTEM.
Isherwood, J. W., London, E. C., England.

SHIPS.
(Builders of.)
American Ship Bldg. Co., Cleveland, O.
Baltimore Dry Docks & Ship Bldg. Co.,
Baltimore, Md.
Bath Iron Works, Bath, Me.
Buffalo Dry Dock Co., Buffalo, N. Y.
Chicago Ship Building Co., South Chicago, Ill.
Collingwood Ship Building Co.,
Collingwood, Ont., Can.
Detroit Ship Building Co., Detroit, Mich.
Fletcher, W. & A., Co., Hoboken, N. J.
Fore River Ship Bldg. Corp., Quincy, Mass.
Johnston Bros., Ferrysburg, Mich.
Manitowoc Ship Building & Dry Dock Co.,
Manitowoc, Wis.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Moore & Scott Iron Works, San Francisco.
Seattle Const. & Dry Dock Co., Seattle, Wash.
Superior Ship Building Co., Superior, Wis.
Tietjen & Lang Dry Dock Co., Hoboken, N. J.
Toledo Ship Building Co., Toledo, O.

SMOKE STACKS.
Lake Erie Boiler Works, Buffalo, N. Y.

SPECIALTIES.
(Steam.)
Penberthy Iniector Co., Detroit, Mich.
Ross Valve Mfg. Co., Troy, N. Y.

SPRINGS.
(Bed and Bunk.)
Southern Bedding Co., Baltimore, Md.

STAYBOLTS.
(Boiler, Iron or Steel, Hollow or Solid.)
Falls Hollow Staybolt Co., Cuyahoga Falls, O.

STEAM TURBINES.
DeLaval Steam Turbine Co., Trenton, N. J.

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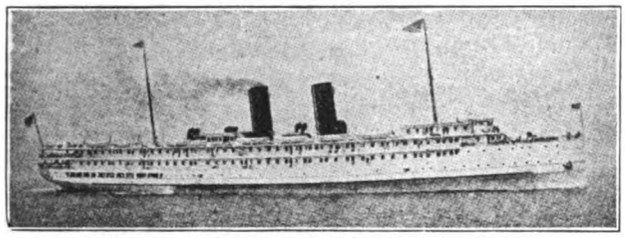

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GREATEST POWER AND SPEED
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The maximum of efficiency.

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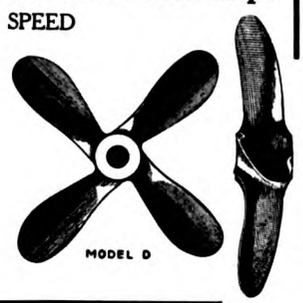
HIGHLAND PARK, CONN.



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Mooring Machines, Deck Winches, Steam Capstans, Etc., Etc.

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The Electric Rudder or Helm Angle Indicator

Placed in pilot house or on bridge in front of quartermaster, allows him to observe the position of the rudder the same as he does the compass. *Can be installed on vessels with or without lighting plan.*

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Fore River Ship Building Corporation

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JOSEPH ERDMAN, 932-936 Congress St. East, Detroit, Mich. Fine groceries and meats. Imported wines and liquors. Paints, oils, leads, etc. Prompt deliveries. Phones: East 110, East 3028.

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THE DULUTH MARINE SUPPLY CO. Largest on the Great Lakes. Meats, groceries, ship chandlery, cabin supplies, oils, ice and milk. Delivered directly and promptly by our three tugs aboard ship. Foot of Fifth Ave. West. 780 both phones.

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International Merchantile Marine Co., New York City, N. Y.

STEERING GEARS.
American Engineering Co., Philadelphia, Pa.
American Ship Building Co., Cleveland, O.
Chase Machine Co., Cleveland, O.
Dake Engine Co., Grand Haven, Mich.
Detroit Ship Building Co., Detroit, Mich.
Hyde Windlass Co., Bath, Me.

STOCKS.
Armstrong Mfg. Co., Bridgeport, Conn.

STOKERS.
American Engineering Co., Philadelphia, Pa.
Babcock & Wilcox Co., New York, N. Y.

STOPPERS.
(Chain.)
American Engineering Co., Philadelphia, Pa.

SUBMARINE ARMOR.
Morse, A. J., & Son, Boston, Mass.
Schrader's, A., Son, Inc., Brooklyn, N. Y.

SUPERHEATERS.
(Marine.)
Babcock & Wilcox Co., New York, N. Y.
Locomotive Superheater Co., New York, N. Y.

SUPPLY HOUSES.
Duluth Marine Supply Co., Duluth, Minn.
Erdman, Joseph, Detroit, Mich.
Schroeder Bros. Co., Two Rivers, Wis.

SURVEYORS.
(Marine.)
Babcock & Penton, Cleveland, O.
Curr, Robert, Port Arthur, Ont., Can.
Furstenau, M. C., Philadelphia, Pa.

SWITCHBOARDS.
General Electric Co., Schenectady, N. Y.

TANKS.
Bath Iron Works, Bath, Me.

TANKS.
(Riveted.)
Lake Erie Boiler Works, Buffalo, N. Y.

TANKS.
(Steel.)
Fore River Ship Bldg. Corp., Quincy, Mass.

TANKS.
(Welded Steel.)
Continental Iron Works, The, Borough of Brooklyn, N. Y.

TELEGRAPH.
(Mechanical.)
Cory, Chas., & Son, New York City, N. Y.

TESTS OF MATERIALS.
Babcock & Penton, Cleveland, O.
Curr, Robert, Port Arthur, Ont., Can.
Furstenau, M. C., Philadelphia, Pa.

THERMIT.
Goldschmidt Thermit Co., New York City.

TORSION METERS.
Cummings Ship Instrument Works, Boston.

TOWING LINES.
(Manila, Wire.)
Waterbury Co., New York, N. Y.

TOWING MACHINES.
American Engrg. Co., Philadelphia, Pa.
Chase Machine Co., Cleveland, O.

TRAMWAYS.
(Wire Rope.)
Waterbury Co., New York, N. Y.

TRANSMISSION.
(Rope.)
Waterbury Co., New York, N. Y.

TUGS.
Bath Iron Works, Bath, Me.

TURBINES.
Bath Iron Works, Bath, Me.
DeLaval Steam Turbine Co., Trenton, N. J.
Fletcher, W. A., & Co., Hoboken, N. J.
Fore River Ship Bldg. Corp., Quincy, Mass.

VALVES.
Ashton Valve Co., Boston, Mass.
Penberthy Injector Co., Detroit, Mich.
Ross Valve Mfg. Co., Troy, N. Y.

VALVES.
(For Water and Gas.)
Ashton Valve Co., Boston, Mass.

VESSEL AGENTS.
Vance & Joys Co., Milwaukee, Wis.

VESSEL BROKERS.
Farley, Edward P., Co., Chicago, Ill.
Richardson, W. C., & Co., Cleveland, O.

WELDING.
(Flue.)
Case, A. Wells, & Son, Highland Park, Conn.

WELDING PROCESSES.
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American Ship Building Co., Cleveland, O.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

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Waterbury Co., New York, N. Y.

WIRE AND WIRING DEVICES.
General Electric Co., Schenectady, N. Y.

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Durable Wire Rope Co., Boston, Mass.
Waterbury Co., New York, N. Y.

WIRE ROPE DRESSING.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

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(Builders.)
Bath Iron Works, Bath, Me.
Rocky River Dry Dock Co., Rocky River, O.

YACHT PLUMBAGO.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

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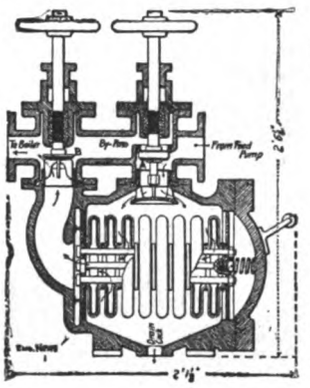

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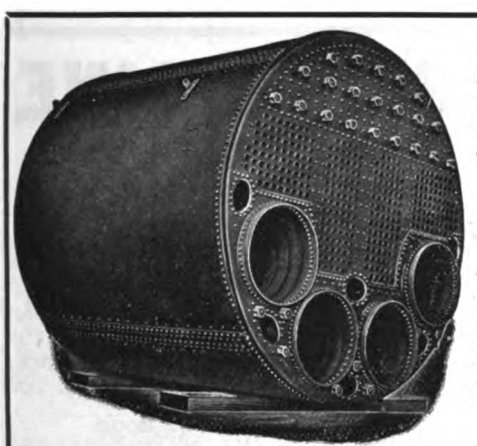

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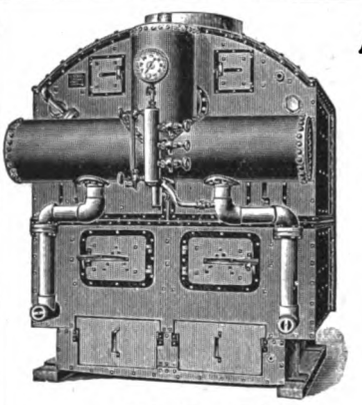

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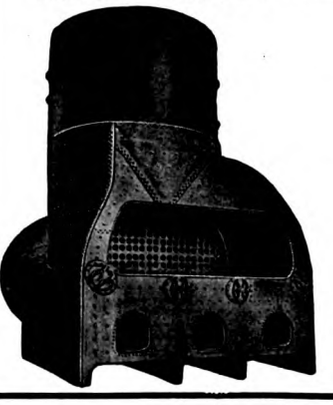

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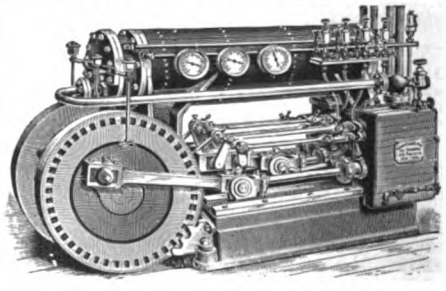

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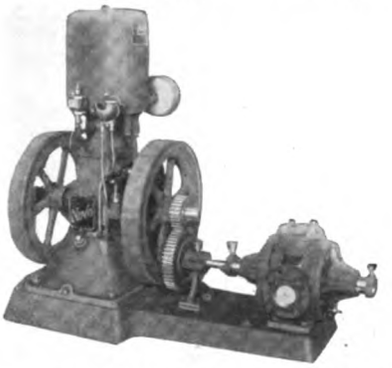

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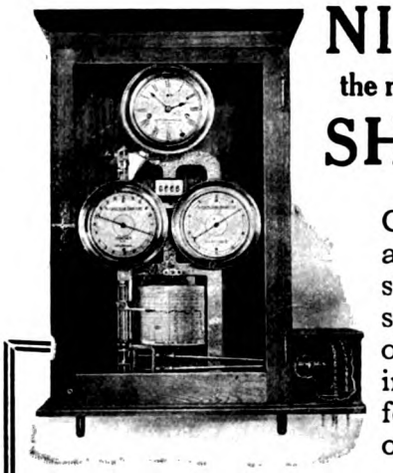

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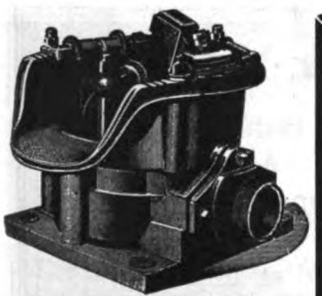
BOTH HOLLOW AND SOLID,
MADE OF BEST QUALITY DOUBLE REFINED CHARCOAL IRON OR STEEL.
CUYAHOGA FALLS. O. U.S.A.

They eliminate drilling expenses and make unfailing tell-tales on fractured or broken stays. They possess double the endurance of Solid Stays, and are a proof without test against broken stays

FALLS HOLLOW STAYBOLT CO.
CUYAHOGA FALLS, OHIO, U. S. A.



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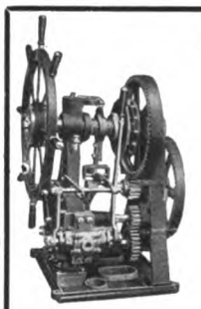
PUMPS FOR MARINE CONTRACTORS, Sewer Departments, Water Works and Railroads.

BOSTON & LOCKPORT BLOCK CO.
124 Condor Street EAST BOSTON, MASS.
NEW YORK CITY 33 South Street CHICAGO 413 Fort Dearborn Bldg. SAN FRANCISCO 110 Market Street

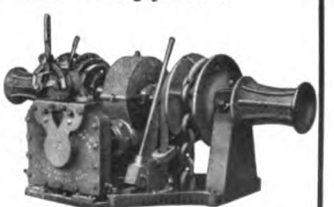
MANUFACTURERS OF
★ STAR BRAND BLOCKS ★
Special Blocks of all styles for all kinds of heavy work
STRONGEST BLOCKS MADE

BLOCKS and PUMPS



STEAM STEERING ENGINES
CAPSTANS
WINDLASSES
MOORING HOISTS
DRILL HOISTS
SPUD HOISTS, ETC.

Write for new catalog just out



Dake Engine Co.
Grand Haven, Mich.

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Coal

For shipment via Great Lakes in CARGO LOTS or for Fueling Vessels. Write or 'phone us for prices on best grades of Domestic, Coking, Gas and Steam coals for prompt delivery.

M.A. HANNA & Co.

Sales Agents, Cleveland

HANNA

The Lorain Coal & Dock Co.

General Offices: COLUMBUS, OHIO

Producers and Shippers of ECLIPSE HOCKING AND CRESCENT PITTSBURGH COAL

Docks and Fuel Lighter **LORAIN, OHIO**

PICKANDS, MATHER & CO.

Lighter "West Shore." Buffalo, N. Y.
Capacity 500 Tons per hour

FUEL LIGHTERS at Buffalo, Erie, Ashtabula, Cleveland. At Detour, Mich., a Fuel Dock equipped with shute capacity of 600 tons. Best quality Pittsburgh coal furnished at any time during day or night.

Western Reserve Building
CLEVELAND, O.

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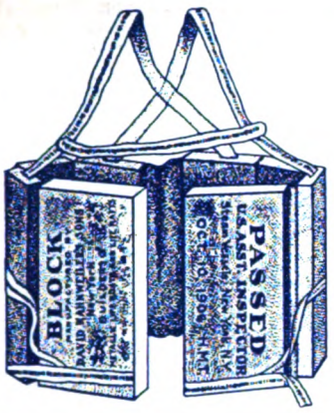
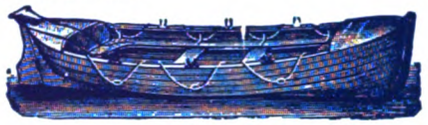


Solid Block Cork Life Preservers

Warranted 24 pounds. Buoyancy and full weight of Cork and Workmanship as required by U. S. Inspectors.

SAFEST CHEAPEST
SOLID CORK LIFE PRESERVERS
RING BUOYS AND FENDERS

Approved and adopted by U. S. Board of Supervising Inspectors. Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Awarded four Medals by World's Columbian Exposition.

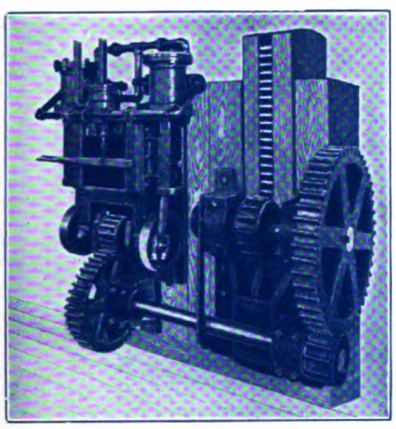


METALLIC AND WOODEN LIFE BOATS
METALLIC LIFE RAFT
MARINE DRAGS LYLE GUNS

WICKS' PATENT RELEASING BLOCKS FOR LIFE BOATS

DAVID KAHNWEILER'S SONS

260 FRONT ST., COR. DOVER ST. NEW YORK CITY



Anchor Hoist Engines and Lock Plates

for Operating Dredge and Drill Boat Anchors

Double 6" x 6", 7" x 9" and 9" x 10" Throttle Reverse Engines

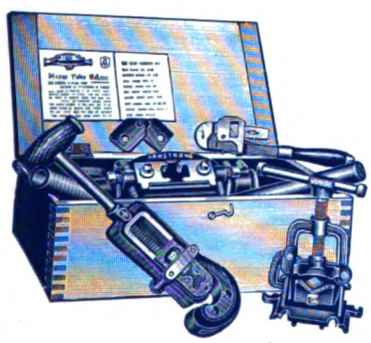
With Gearing to suit the size of Anchors

The Hoist is compact and efficient, and occupies no deck room. Any arrangement can be made to suit local conditions.

We build the engines with either throttle or link reverse, as well as non-reversible and for a great many purposes.

—BUILT BY—

Superior Iron Works Company, SUPERIOR, WIS.



ARMSTRONG COMBINATION KITS

CONSISTING OF

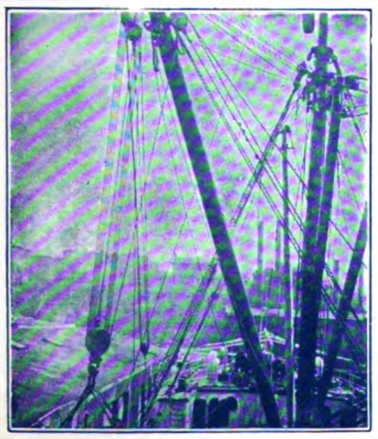
1 No. 2 Genuine Armstrong Stock	¼ in.	to 1 in. R
1 " 1 Model B Pipe Cutter	⅛	" 1¼
1 Junior Hinged Pipe Vise	⅛	" 1¼
1 10 in. Stillson Wrench	⅛	" 1

STOCKS ARE FITTED WITH BARD ADJUSTABLE BUSHING
IN A HARD WOOD CASE
ENGINEERS AND FITTERS APPRECIATE THIS KIT.

Manufactured by

THE ARMSTRONG MFG. CO.

296 Knowlton St., BRIDGEPORT, CONN.
NEW YORK, 248 Canal St.



Durable Wire Rope Co.

93-95 Pearl St., Boston, Mass.

Durable Wire Rope will Not Rust or Rot and is not affected by Salt Water or Climatic Conditions

FOR

Mooring Lines	Towing Hawsers	Stevedoring	Tiller Ropes
Ship Rigging	Dredging	Boat Falls	Yacht Rigging
Hoisting	Coal Pockets	Pile Driving	Fasts

BRANCH OFFICES

165 W. Lake St., Chicago, Ill. *701 St. Clair Ave. N. E., Cleveland, O.*

NEW YORK AGENTS: HEGEMAN & WARD, 43 SOUTH STREET

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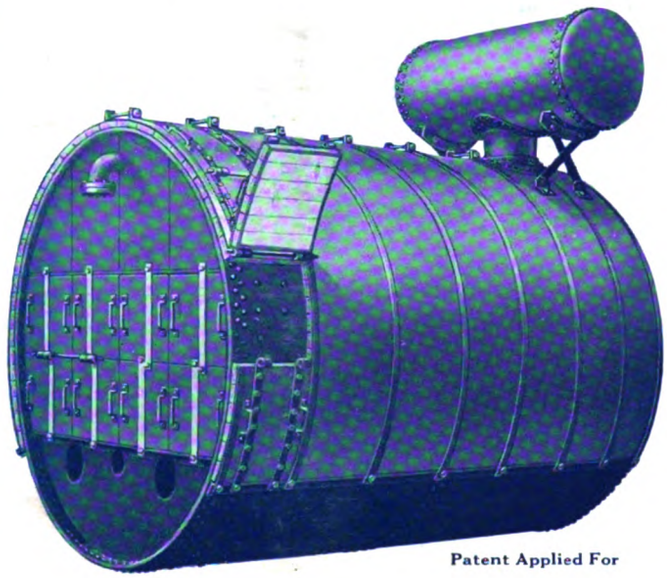
Lift a Panel and Fix Your Stay Bolts



Patent Applied For

A Boiler Covering in Panels

Entirely new

Removable in Units

Simply lift each section on its hinge and the stay bolts are in instant view

or

Remove a single strap to see entire section.

CAREY COVERING IN PANELS is adaptable to every type of marine boiler. Send size and type of boiler.

Prices and complete description gladly furnished.

THE CAREY COMPANY

Cleveland, Ohio

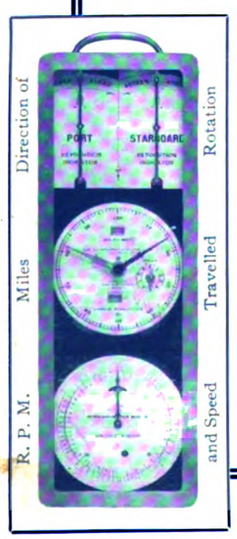
As a ship captain, must you ask the engineer,—

"Just how fast and how far have we gone"?

You can get quicker and more accurate information if you install a

CUMMINGS ENGINE LOG

It registers the exact distance and speed, thus placing it within the power of the captain to avoid danger and delay. Also indicates direction of rotation of each engine, showing instantly whether signals are being answered correctly.



INSTALL A SHIP'S BRAIN IN YOUR PILOT HOUSE

then, no matter how dense the fog, the captain can guide his ship to safety without loss of time.

"Safety-First" demands that a Cummings Engine Log be placed in ***every*** pilot house.

We have some interesting and instructive catalogs that we would like to send you. All you have to do is to say the word.

Covered by specifications of all classes of naval vessel building. 75 Naval Installations.

Cummings Ship Instrument Wks.
110 High Street Boston, U. S. A.

TRADE PENBERTHY MARK.

AUTOMATIC INJECTOR

No other INJECTOR on the market so simple, reliable or durable.

800,000 Engineers testify as to its merits. WORLD'S STANDARD.

The Penberthy Automatic is absolutely so, it is re-starting, self-draining. It is the ideal Injector for Marine use.

"XL--96" EJECTOR

On account of the great elevating and lifting power of the "XL-96" when using a minimum amount of steam, it is at its best when replacing the bilge pump.

Our No. 27 Catalog tells of these. Write for it—Now.

Penberthy Injector Co.

DETROIT, MICH.

Canadian Factory—Windsor, Ont.

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THE MARINE REVIEW

VOL. 46 CLEVELAND JULY, 1916 NEW YORK No. 7

"WEW" VALVES

are especially made for Marine Service, and are thoroughly guaranteed in every respect.

CROSS VALVES; SNIFTING VALVES; RELIEF VALVES; THROTTLE VALVES; GATE VALVES; CHECK VALVES; OIL CUPS; GREASE CUPS; LUBRICATORS; TRY COCKS; WATER GAUGES; STEAM GAUGES AND STEAM COCKS.

We carry a full line of Bronze and Iron Body Valves in stock. Send at once for our catalog which shows the most important and most used types of valves. If the valve you require is not shown, remember we make it.

The "WEW" is the heaviest and best valve made.

WRITE US

WILLIAM E. WILLIAMS

62 FRONT ST., NEW YORK

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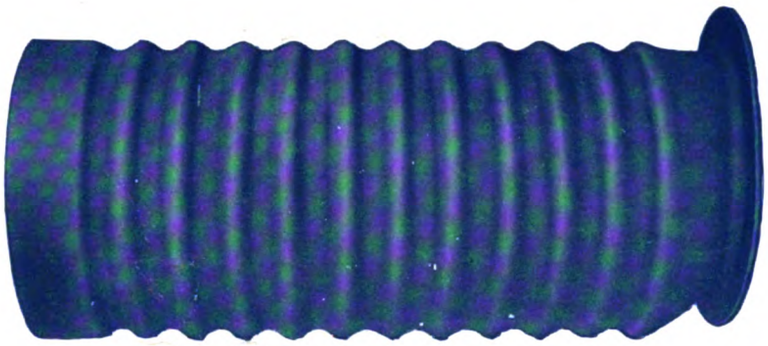
Morison Suspension Boiler Furnaces



For Land and Marine Boilers

Uniform Thickness **Easily Cleaned** **Unexcelled for Strength**

Also FOX CORRUGATED FURNACES

Manufactured by

THE CONTINENTAL IRON WORKS

West and Calyer Sts., BOROUGH OF BROOKLYN, N. Y.

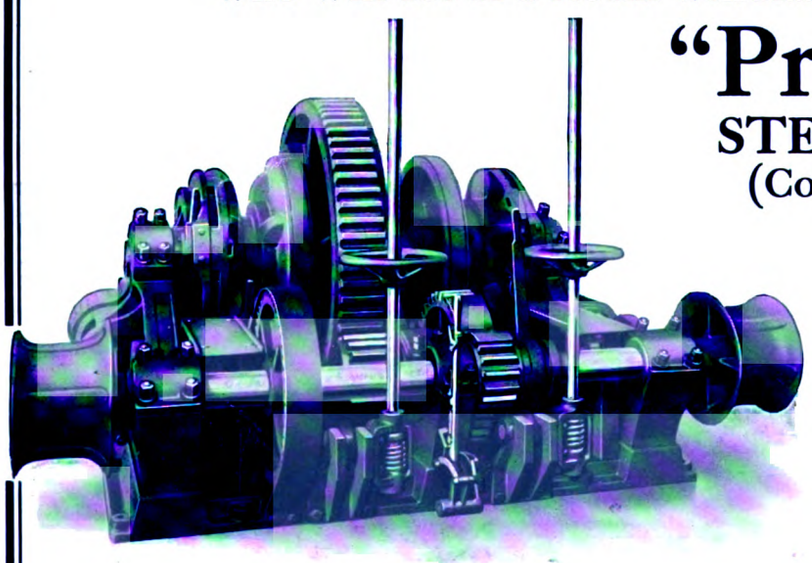
Greenpoint Ferry from East 23rd Street, New York

"Having a PULL means having a friend in power who will act as a steam windlass for you." The

"Providence"

STEAM WINDLASS

(Compound Spur Gears)



has another kind of *pull*, and plenty of it. It has 15 per cent more *pull* than the worm geared types and at 50 per cent faster speed. You have been looking for just this combination. Our price will please you, too.

Write us today.

AMERICAN ENGINEERING COMPANY

SUCCESSORS TO AMERICAN SHIP WINDLASS CO. AND WILLIAMSON BROS. CO.

MACHINISTS AND FOUNDERS

PHILADELPHIA

15-312

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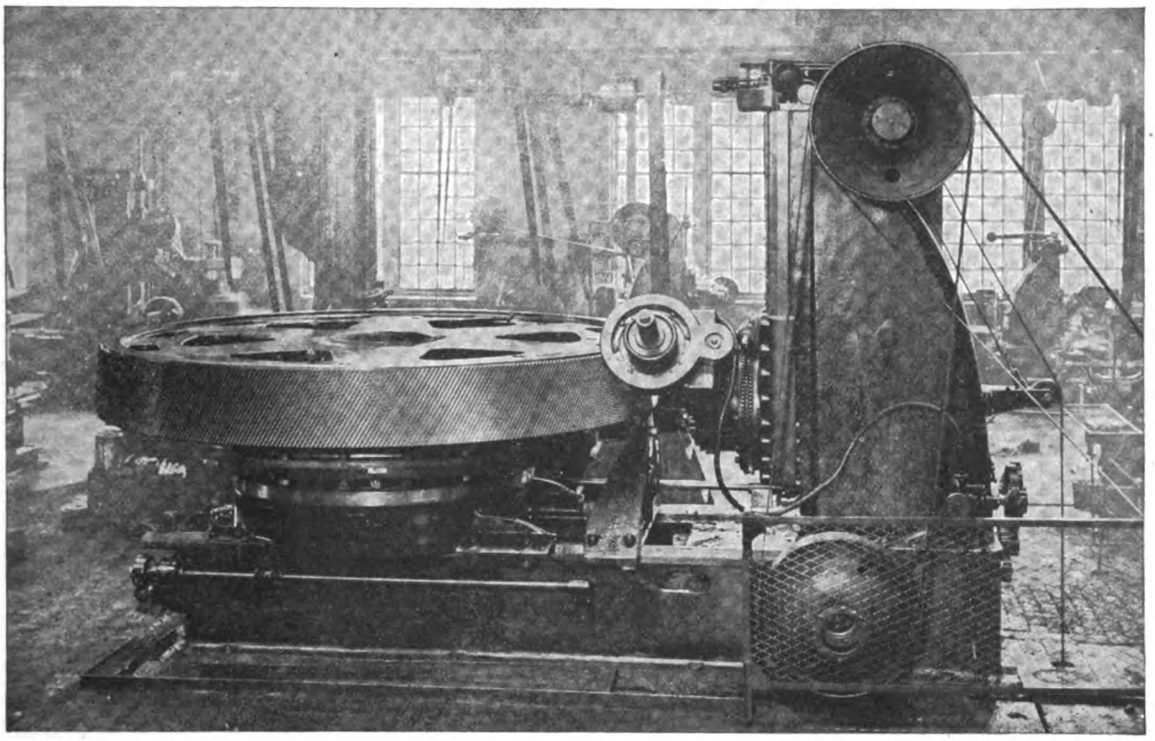

11000 H. P. Westinghouse Marine Reduction Gear in Hobbing Machine, Speed Reduction *3600* to *200* RPM.

Westinghouse Marine Reduction Gears

The engineering and commercial advantages of Westinghouse Geared Turbines for ship propulsion, as compared with either direct connected turbines or reciprocating engines, are mainly:

Increased propeller efficiency
Increased turbine efficiency
Reduced space and weight of machinery
Reduced cost of upkeep.

The Westinghouse Machine Company

East Pittsburgh, Pa. - Washington, D. C.

HUNT, MIRK & COMPANY

San Francisco - Seattle

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Why Is a Salesman?

"Just Because the Salesman Brings Home the Bacon we Must Not Conclude That He Originated, Killed and Cured the Pig"

UNDER these captions, Charles Austin Bates, in a recent issue of Printers' Ink, presents the reply of the General Manager of a large company spending some $60,000 a year in advertising, when, at a meeting of the directors of the company, one director said: "With that sixty thousand we could almost double our force of salesmen, and salesmen bring in something every week.

¶ "I would rather increase the advertising to one hundred thousand and so insure greater efficiency of the present sales force. *******

¶ "There are three links in our selling plan: First, advertising; second, salesmen; third, our correspondence department which follows up both prospects and customers. It is difficult to determine which of these links is the most important. The salesman brings in the actual order, but the prospect is two-thirds sold before the salesman sees him.

¶ "The man who gathers the fruit certainly has no more to do with the profitable result than he who plowed, fertilized and planted the ground, or he who cultivated it and opened up the gate of the irrigating ditch when needful.

¶ "Salesmen are important and necessary, as is conclusively proved by the fact that two men working in like territory, under like conditions, produce different results. But just because the salesman brings home the bacon, we must not conclude that he originated, killed and cured the pig.

¶ "The selling plan that depends wholly upon salesmen and ignores advertising and mail follow-up, is about as sensible as the man who walks up ten flights of stairs when the elevator is running. And the salesman who thinks he is the whole works, should remember the frog who tried to be as big as a bull—he made a bull, but not of the kind he intended.******"

¶ Are *you* depending upon your salesmen to originate, kill and cure the pig, single-handed; or are you taking cognizance of the various important factors entering into sales at a reasonable cost, by directing and assisting your salesmen through judicious advertising?

¶ As Experts, may we discuss Judicious Advertising with you?

THE MARINE REVIEW

CLEVELAND

New York

320

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